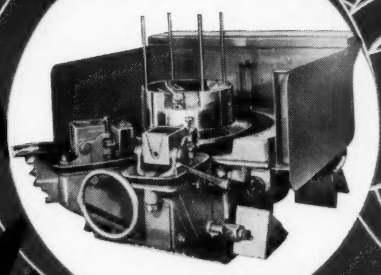
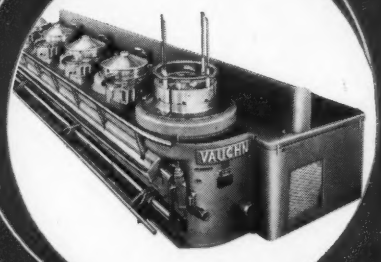
WIRE AND WIRE PRODUCTS

JULY 1945

New World Markets for Wire





Vaughn MOTOBLOC and MOTOBLOX

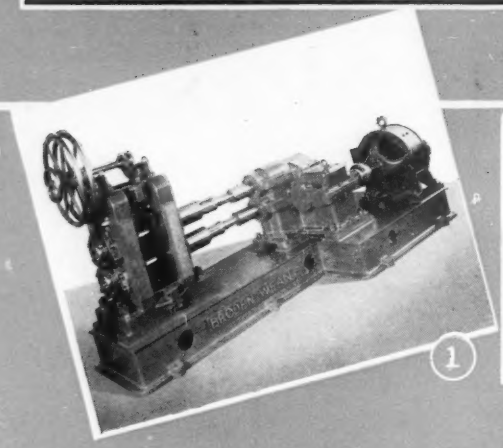
You can see the future from here . . . wire tonnage of tremendous quantity for reconstruction . . . much of it produced by versatile Vaughn Machinery as an integral part of every wire program, in every year of production progress.

THE VAUGHN MACHINERY COMPANY
CUYAHOGA FALLS, OHIO

COMPLETE COLD DRAWING EQUIPMENT . . . Continuous or Single Role . . . for the Largest Bars and Tubes . . . for the Smallest Wire . . . Ferrous, Non-Ferrous Materials or their Alloys.

OFFICIAL PUBLICATION OF THE WIRE ASSOCIATION

WEAN-BRODEN



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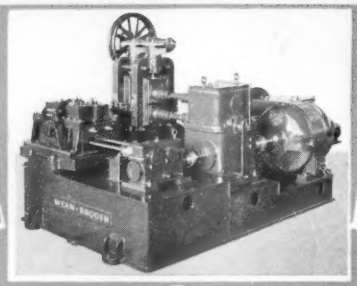

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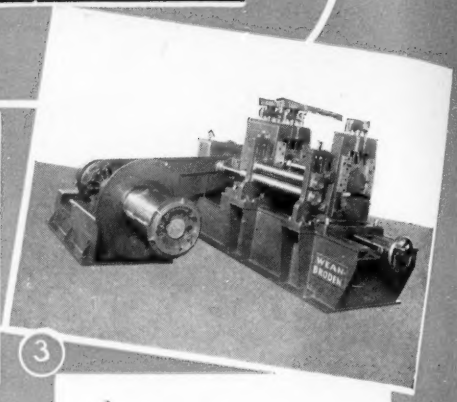

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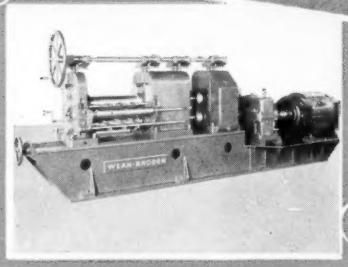


4

1. Small Cold Rolling Strip Mill
2. Special Strip Cold Rolling Mill
3. Strip Reel and Slitting Unit
4. Heavy Duty Slitter
5. Special Alloy Single Draft Heavy Duty Vertical Wire Drawing Block for ⅝" Round Rod

THE Wean Engineering Company, Inc., have long been recognized as Specialists in sheet, strip and tin mill equipment. . . . The Broden Construction Company specializes in the manufacture of narrow strip and wire mill equipment.

With the extended facilities of The Broden Construction Company as a subsidiary of The Wean Engineering Company, Inc., it is now possible to serve the steel industry more effectively.

COLD ROLLING MACHINERY

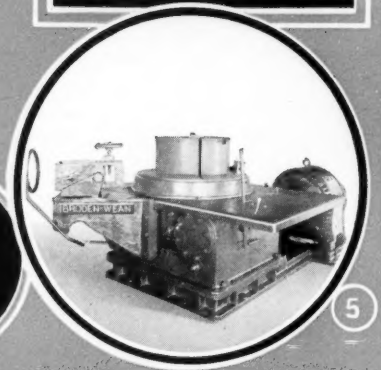
For 36" Wide Material and Narrower

Mills • Reels • Slitters • Levelers • Coilers • Edgers
Scale Breakers • Shears • Scrap Ballers
Continuous Pickling

WIRE MILL EQUIPMENT

Wire Drawing Machines • Patenting • Galvanizing and Tinning Take-Up Frames • Wire Flattening • Spoolers
Nail Galvanizing and Blueing

HOLMQUIST BARBED WIRE *and* **WIRE FENCE MACHINERY**



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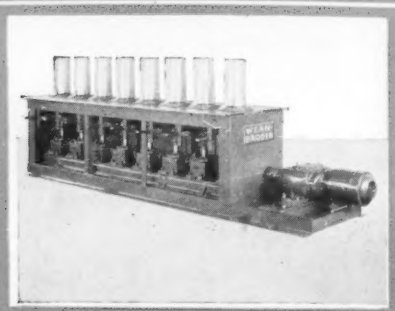
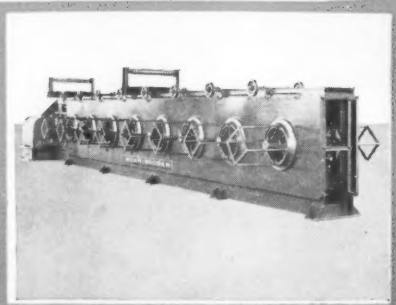
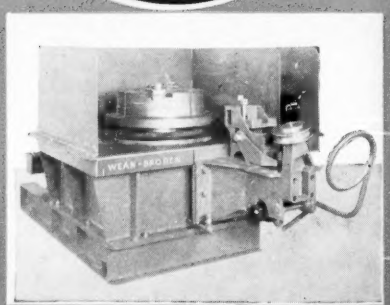
The BRODEN CONSTRUCTION Co., Inc., Cleveland, O.
A SUBSIDIARY COMPANY OF
The WEAN ENGINEERING Co., Inc., Warren, O.



FINE WIRE TINNING UNIT



MULTIPLE WIRE TAKEUP FRAME



TWO DRAFT CONTINUOUS WIRE DRAWING MACHINE

MUSIC WIRE and HIGH CARBON STRIP STEEL

can be substituted for your shortage items!

(Government Surplus Property)

IMMEDIATE DELIVERY THROUGH
RECONSTRUCTION FINANCE CORPORATION

PRICED FOR USE AS SUBSTITUTES

Begin negotiations for your share in large available tonnage of music wire and strip steel.

Shortages of wire and strip steel have put mill deliveries well into the future. Both these items are now on sale at prices to permit substitution for many other grades of wire and strip.

A CONTINUING SALE

This continuing sale by Reconstruction Finance Corporation places at your disposal *new* music steel spring wire in excellent condition, and new high carbon, cold-rolled strip steel, in fair to good condition. The strip steel is in many gauges and widths, mostly in coils. The music wire is well-protected, and is available in various gauges, catchweight coils. Both classifications are priced for use as substitutes for many other grades of wire or strip. The music wire is located in Boston, New York, Philadelphia, Cleveland, Chicago, and Pacific Coast regions; the strip steel in the East and Middle West.

IT'S EASY TO BUY FROM RFC

Sales will be made direct to purchaser. Contact your nearest RFC Disposing Agency for complete information.

ASK YOUR NEAREST RFC DISPOSING AGENCY FOR INFORMATION ON AVAILABILITY OF CARBON BARS, ALLOY BARS AND TOOL STEEL

RECONSTRUCTION FINANCE CORPORATION

A DISPOSAL AGENCY DESIGNATED BY THE SURPLUS PROPERTY BOARD

Disposing Agencies at: Atlanta • Boston • Charlotte • Chicago • Cleveland • Dallas • Denver • Detroit Houston • Kansas City, Mo. • Los Angeles • Minneapolis • New Orleans • New York • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle

BUY WAR BONDS

26

Where's the whisk-broom?

Here he is, all set to leave for the office, but the family whisk-broom has been mislaid again, and he can't give his suit a last-minute brushing. And all because the whisk-broom handle doesn't have one of those convenient hanger rings, so that you can hang it on a closet hook.

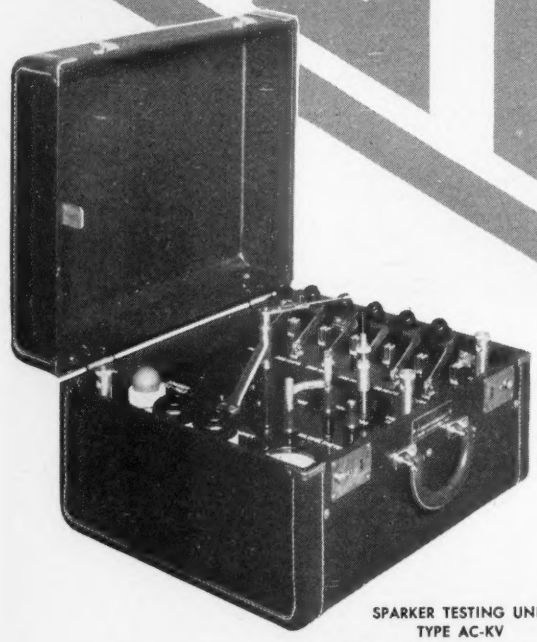
The countless little utility gadgets made from wire are hard to get today. Things like hanger rings, egg beaters, coat hangers, glove stretchers, potato mashers and refrigerator baskets—to name but a few. Of course that's due to the immense demands for wire for fighting equipment and essential uses here at home. Bethlehem wire mills are going full tilt to meet the continuing demand.

We appreciate the understanding and patience that our wire customers have shown all through the war emergency. The minute war needs permit, Bethlehem wire and rods will again be available for the thousand and one peacetime products made of wire—including the many convenience items that add so much to the comfort and satisfaction of every-day living.

BETHLEHEM STEEL COMPANY
General Offices: Bethlehem, Pa.
Bethlehem Steel Export Corporation, New York City

BETHLEHEM STEEL

BETHLEHEM WIRE



SPARKER TESTING UNIT
TYPE AC-KV

WIRE SPARKER CALIBRATING INSTRUMENT

This unit is suitable for testing the fault-relay circuit response efficiency of all types of wire sparkers of any make — both as to speed and as to sensitivity — from any 110 volt supply, or in place on automatic reelers. It is also equipped with an electrostatic kilovoltmeter and divider for checking sparker testing voltages up to 20,000.

The speed of response of fault relays (ranging from .001 to .1 second) is tested by a constant-speed motor, driving brass sectors of various widths past an adjustable stationary needle point.

Fault relay sensitivity is tested by placing variable series capacitances (from 25 to 575 micro-microfarads) in the test (high-tension) circuit of the wire sparker.

The unit is furnished complete with needles, attachment cords and fittings, is enclosed in an imitation leather case, 17½" x 15" x 11", and weighs only 26 lbs. Electrical parts are mounted on a hinged bakelite panel, with space underneath for accessories.

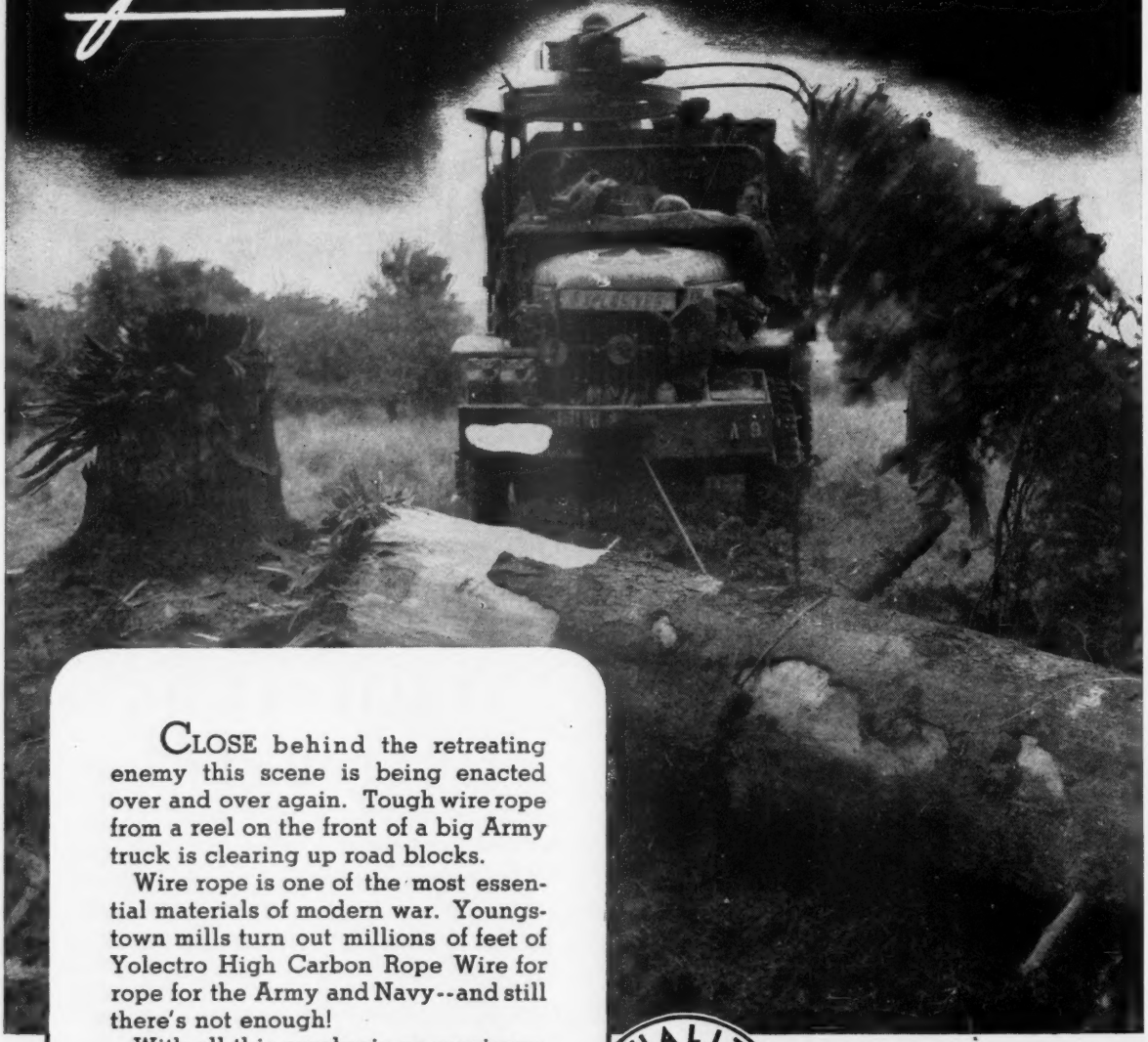
Send for specification sheet

JAMES L. ENTWISTLE CO.

43 CHURCH ST., PAWTUCKET, R. I.

WORLD'S LEADING MANUFACTURER OF SPARK-TESTING EQUIPMENT

Your Wire at Work



CLOSE behind the retreating enemy this scene is being enacted over and over again. Tough wire rope from a reel on the front of a big Army truck is clearing up road blocks.

Wire rope is one of the most essential materials of modern war. Youngstown mills turn out millions of feet of Yolectro High Carbon Rope Wire for rope for the Army and Navy--and still there's not enough!

With all this emphasis on maximum volume production, quality is none-the-less jealously guarded. The high standards that have given Youngstown wire its enviable reputation are rigidly maintained. Thus we can meet your specifications, either standard or special as to physical tolerances and chemical and metallurgical characteristics. Consequently, we'll be glad to talk to you right now about wire to meet your most exacting requirements.

QUALITY TRADE MARK YOUNGSTOWN SERVICE

Army Engineers remove a tree from the road, to speed up the advance of American doughboys and wheeled equipment. Official U. S. Signal Corps photo.

YOUNGSTOWN

THE YOUNGSTOWN SHEET AND TUBE COMPANY

YOUNGSTOWN 1, OHIO

Manufacturers of

CARBON · ALLOY AND YOLOY STEELS

Pipe and Tubular Products - Sheets - Plates - Conduit-Bars-Coke Tin Plate-Electrolytic Tin Plate-Rods-Wire-Nails-Tie Plates and Spikes.

WIRE & WIRE PRODUCTS, Vol. 20, No. 7, July, 1945. Executive Office, 300 Main St., Stamford, Conn. Published by the Quinn-Brown Publishing Corp., Richard E. Brown, President; R. S Spengel, Sec. and Treas. Publication office, 206 Summer St., Stamford, Conn. Subscription price: U. S. $5.00; Canada, $5.00 per year, 50 cents per copy; Foreign $7.50 per year. Entered as second class mail at the Post Office, Stamford, Conn., Feb. 9, 1945, under Act of March 1879.

BEACH PARTY

. . . . where all the guests are gate-crashers

FROM one Pacific island to another, until Tokyo itself is taken, grim American warriors will continue to visit the enemy without invitation. And with our invasion forces will go Spencer precision-made assault wire — light, highly flexible and strong — to warn of enemy infiltration . . . to speed reinforcements to a threatened sector. Proved under fire, Spencer precision steel and alloy wire is your guarantee of superior quality, unexcelled performance.

Photo U. S. Signal Corps.

SPENCER WIRE

Precision

FINE STEEL AND ALLOY WIRE

Spencer Wire Company
WEST BROOKFIELD PLANT
WEST BROOKFIELD • MASS.

Tantalum – Tungsten

CARBIDE DIES

MORE TONNAGE
•
BETTER FINISH

Time spent in shut-downs for die changes, and for polishing and re-cutting dies — all affect production. Tantalum-Tungsten Carbide has a definite lubricating action — it reduces the tendency of the wire or rod to gall and seize as it passes through the die. Result: A smoother finish free from score marks. Use Vascoloy-Ramet *Tantalum-Tungsten* Carbide Dies for better finish and increased production.

VASCOLOY RAMET CORPORATION

CARBIDE TOOLS and TANTUNG CAST ALLOY CUTTING TOOLS
NORTH CHICAGO, ILL. · SALES & SERVICE IN PRINCIPLES CITIES

4509

CONTINENTAL WIRE MADE TO SPECIAL SHAPES CUTS COSTS ★ IMPROVES PRODUCTS

The use of wire drawn to special shapes is not a new practice . . . but it is a fast growing one. More and more manufacturers are learning how Continental wire made to fit the particular application can cut product costs and improve quality.

If you are a manufacturer, it may pay you to check over your product. Look for parts made of wire that can be "shape engineered" to do their job better and more economically. Continental shaped wire is used in many different products. It is available in a wide range of tempers, finishes and coatings; in sizes up to one-half inch diameter. Write today for a copy of Continental's handy new booklet with information for manufacturers.

CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF *Manufacturer's Wire* in many sizes, shapes, tempers and finishes, including Galvanized, KOKOTE, Flame-Sealed, Coppered, Tinned, Annealed, Liquor Finished, Bright, Lead Coated, and special wire. ALSO, Coated and Uncoated Steel Sheets, Nails, Continental Chain Link Fence, and other products.

Sixth of a series of Artzybasheff's impressions of the manufacture of steel wire products *Enlarged reproduction free on request*

SPAGHETTI SPINNER

A speeding hot steel rod—like a string of red hot spaghetti—emerges from a pipe guide into a spinning steel pan. Thus it ends a trip through 16 stands of rollers that squeeze a billet into a wire rod.

Considerable care and skill are needed to roll wire rods correctly. For a poorly rolled rod will either cause failure in wire drawing or remain as a hidden defect in the wire.

Rolling is one of the many controlled steps in the manufacture of Wickwire Spencer Wire. From the making of the steel in our own open hearths through drawing and processing in our own modern wire mills, every vital production step is subject to careful, competent control.

Wickwire Spencer metallurgists have had many years experience in developing special formulae for widely differing wire needs. Their knowledge of the field is your assurance that they can find the right answer for your problems. Every detail is checked thoroughly to give you high performance at low cost.

Wickwire Spencer can provide the type of wire to meet your requirements. You'll get wire that is uniform in size, tensile and stiffness. That's the way wire must be made to avoid trouble on your wire-working machines. We are equipped to supply high or low carbon wire; round or shaped; in a wide variety of sizes, grades, tempers and finishes.

Send your wire questions to

WICKWIRE SPENCER STEEL COMPANY

500 FIFTH AVENUE, NEW YORK 18, N. Y.

Abilene • Boston • Buffalo • Chattanooga • Chicago • Clinton (Mass.) • Detroit • Houston • Los Angeles • Philadelphia • San Francisco • Tulsa • Worcester

KEEPING wire in the process of drawing "COOL AS A MOUNTAIN STREAM" is an attainment we hope eventually to reach. We aim always to take the problem of ultimate perfection in wire lubrication step by step as it is put up to us to solve.

Standard Wire Lubricants are universally used both in this country and in foreign countries. We welcome the opportunity of extending our personal service in any drawing problems you may have.

STANDARD INDUSTRIAL COMPOUNDS CO.

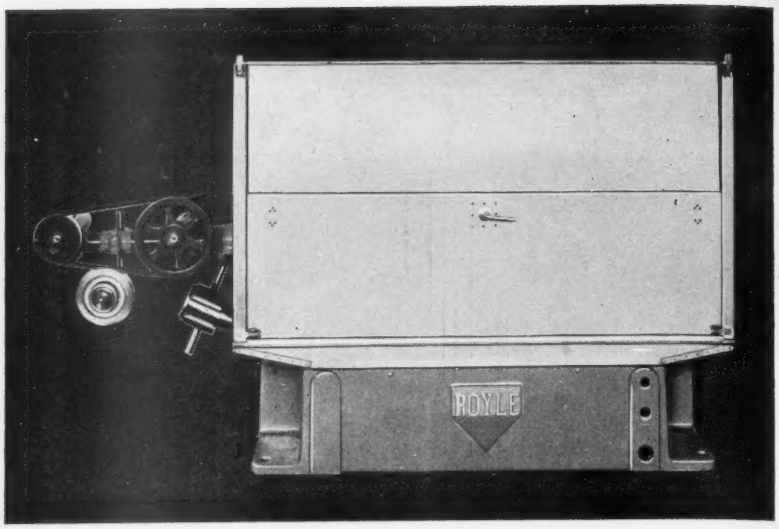
4600 W. FERDINAND ST.

CHICAGO 44, ILLINOIS

Standardize with Standard

THE ROYLE 36"

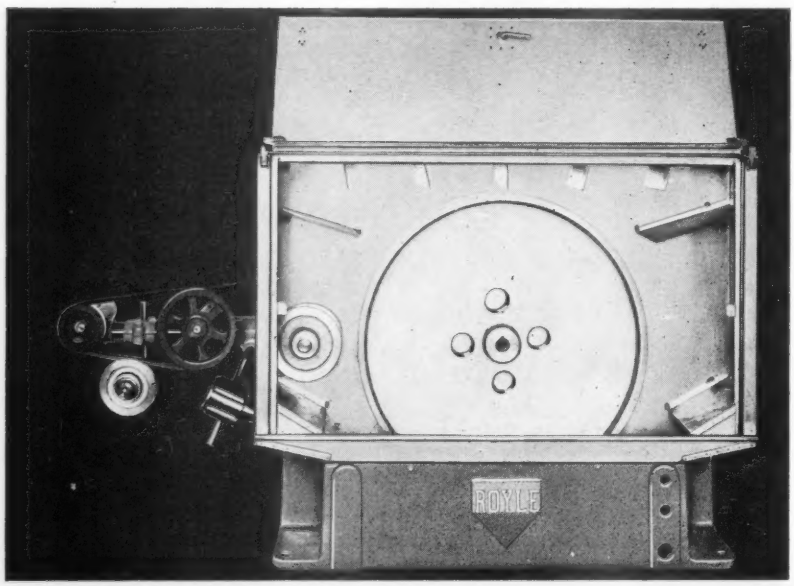
HIGH SPEED CAPSTAN FOR RESIN INSULATED WIRE



CHECK THESE FEATURES

- Stainless steel watertight enclosure
- Total enclosure permits higher wire speeds
- More efficient wire puller stabilizes wire speed
- Secondary idler pulleys guide wire across capstan preventing rubbing and permitting greater quantities of wire to be cooled simultaneously
- Quiet running
- All bearings are located outside of enclosure to prevent contact with water
- Built-in air wiper
- Full size folding side assures maximum accessibility
- All interior surfaces which are touched by wire or spray are of aluminum or corrosion resisting metal to withstand the chemical reaction of the various resins

Write for Complete Details



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ROYLE PATERSON N. J. 1880

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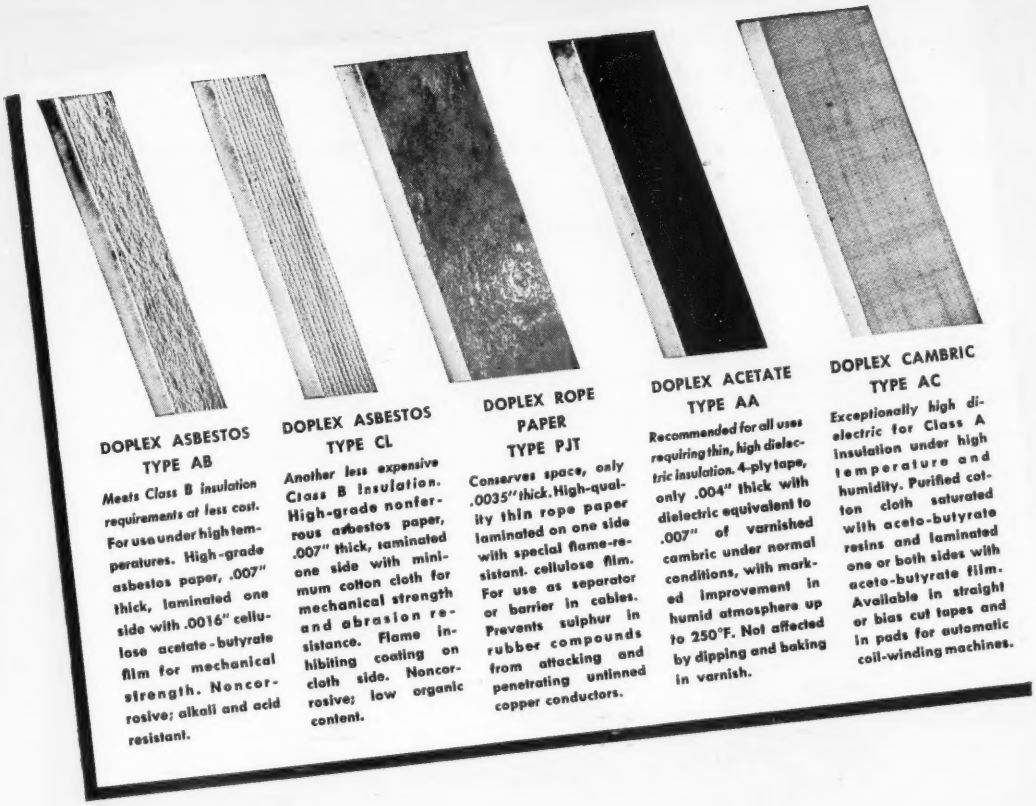


DOPLEX ASBESTOS TYPE AB

Meets Class B insulation requirements at less cost. For use under high temperatures. High-grade asbestos paper, .007" thick, laminated one side with .0016" cellulose acetate-butyrate film for mechanical strength. Noncorrosive; alkali and acid resistant.

DOPLEX ASBESTOS TYPE CL

Another less expensive Class B insulation. High-grade nonferrous asbestos paper, .007" thick, laminated one side with minimum cotton cloth for mechanical strength and abrasion resistance. Flame inhibiting coating on cloth side. Noncorrosive; low organic content.

DOPLEX ROPE PAPER TYPE PJT

Conserves space, only .0035" thick. High-quality thin rope paper laminated on one side with special flame-resistant. cellulose film. For use as separator or barrier in cables. Prevents sulphur in rubber compounds from attacking and penetrating untinned copper conductors.

DOPLEX ACETATE TYPE AA

Recommended for all uses requiring thin, high dielectric insulation. 4-ply tape, only .004" thick with dielectric equivalent to .007" of varnished cambric under normal conditions, with marked improvement in humid atmosphere up to 250°F. Not affected by dipping and baking in varnish.

DOPLEX CAMBRIC TYPE AC

Exceptionally high dielectric for Class A insulation under high temperature and humidity. Purified cotton cloth saturated with aceto-butyrate resins and laminated one or both sides with aceto-butyrate film. Available in straight or bias cut tapes and in pads for automatic coil-winding machines.

VERSATILITY is a good Tape measure

DOPLEX tapes combine the electrical, mechanical and chemical properties of their basic materials to meet various insulating requirements, such as:

Asbestos for resistance to high temperatures. (Types AB and CL)

Cellulose film for flame resistance and protection of untinned copper conductors. (Type PJT)

Aceto-butyrate or cellulose acetate for acid resistance and high dielectric. (Types AB, AA, AC)

Purified cotton fibre for strength and abrasion resistance. (Types CL and AC)

Widths are obtainable from one-eighth inch up, with a range of put-ups on universal cops and pads, for manual or mechanical application. Quick deliveries for priority orders.

ARMY E NAVY

CLEVELAND PLANT

WORDS CAN'T TELL THE STORY
USE THE COUPON TO GET SAMPLES FOR YOUR OWN TESTS

Please check samples desired and sign as indicated. Attach coupon to your letterhead and mail to The Dobeckmun Company, Cleveland 1, Ohio.

- ☐ Doplex asbestos: Type AB
- ☐ Doplex asbestos: Type CL
- ☐ Doplex rope paper: Type PJT
- ☐ Doplex acetate: Type AA
- ☐ Doplex cambric: Type AC

Name_____

Title_____

Company_____

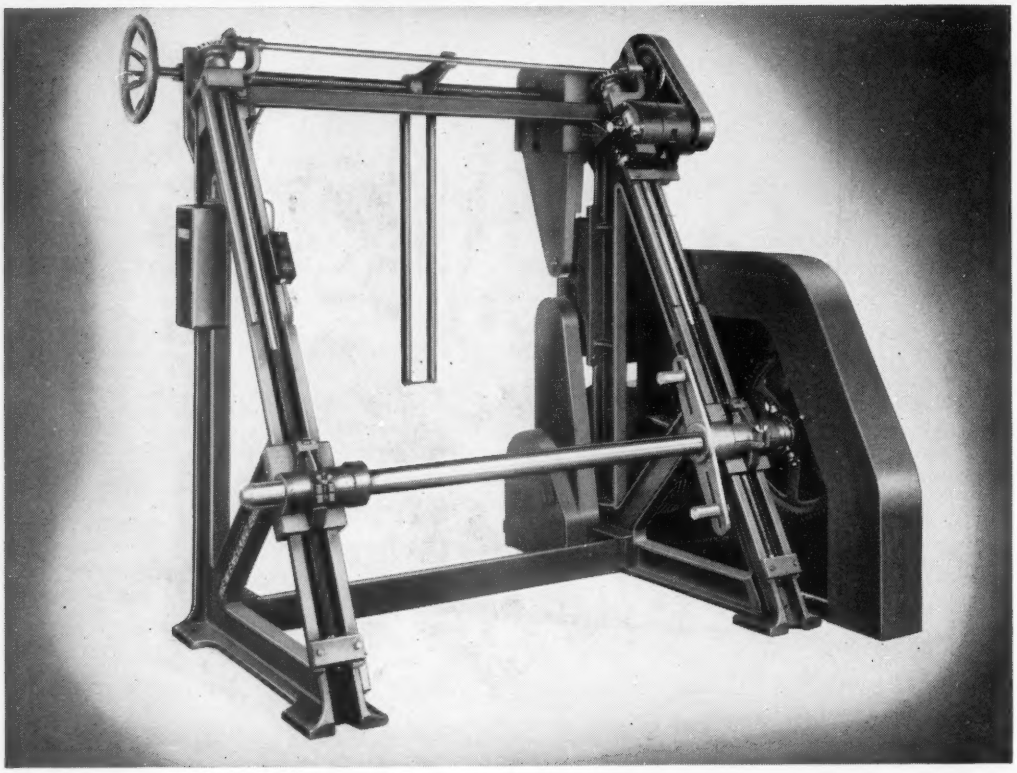
WWr

THE DOBECKMUN CO.

INDUSTRIAL PRODUCTS DIVISION • CLEVELAND 1, OHIO

Makers of "LEXEL" insulating tape and "DOBAR" laminated paper insulation

ONE MAN TAKE-UPS



Standard TAKE-UPS of this type are made to take a maximum reel diameter of 48″, 72″, 84″.

Reels are raised and lowered by power.

Adjustable traverse motion, with lay variation by means of Reeves transmission, is furnished; likewise adjustable mechanical frictions of either the rope or band type.

These machines are also built with individual motor drive of the constant tension type. This insures constant tension. It eliminates the mechanical friction and its wearing parts, and does away with mechanical drive between take-up and main machine. An electrically operated traverse motion is used with this type.

Larger sizes built on request.

NEW ENGLAND BUTT COMPANY

304 PEARL STREET

PROVIDENCE 7, RHODE ISLAND, U. S. A.

HUDSON WIRE COMPANY

PRODUCERS OF FINE WIRES IN ALL METALS

FINE BARE WIRES

High Brass, Low Brass, Zinc 99.99+ and High Tensile Zinc, Commercial Bronze, Phosphor Bronze, Pure Tin, Lead, Antimonial Lead, Tinsel Lahns, Silver Plated Copper, False Gold and Copper.

Cadmium, Nickel Silver, 10%, 18% and 30%; Silver Plated Copper, False Gold and Special Brass and Bronze Alloys to Specification, Metallic Fibre for Packing Purposes, Copper, Bronze, Zinc, Lead and Aluminum.

WIRES FOR METAL SPRAYING

Pure Lead, Lead Alloy, Pure Zinc, Zinc Alloy, Copper, Tin, High Brass, Low Brass, Solder Wire, High Conductivity Electric Wire.

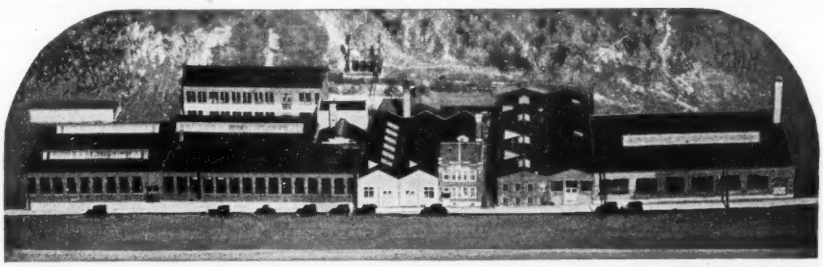
Cadmium, Nickel Silver (10%, 18%, 30%), Aluminum, Monel Metal, Phosphor Bronze, Pure Nickel, Commercial Bronze.

Look for the name — **HUDCO** — A guarantee of quality

"HUDCO" specially processed Copper Wire for enamelling purposes is drawn from Selected Copper, insuring the maximum conductivity. This is but one example of the use of the most advanced and approved materials and methods in our processing.

BETTER WIRE AT LOWER COST

Write for Prices and Samples • Let Us Quote on Your Requirements



"HUDCO" PLANT AT OSSINING, NEW YORK

HUDSON WIRE COMPANY

Established in 1902 — Successors to Royle & Akin

OSSINING, NEW YORK

PREVENT WASTE

with RODINE

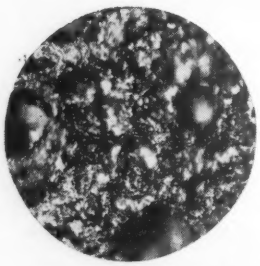


Fig. 1. Alloy Steel 30X pickled one hour in uninhibited acid bath. No trace of polishing marks or original polished surface are visible—the pits are so deep the bottoms are out of focus.

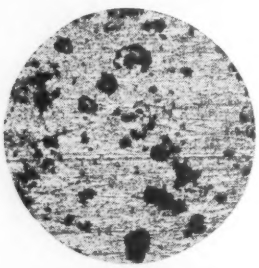


Fig. 2. Alloy Steel 30X pickled three hours in acid bath inhibited with Rodine No. 81. Pickled three times as long as in Fig. 1. Only a few shallow pits appear. Most of surface is unchanged—the polishing marks are still visible.

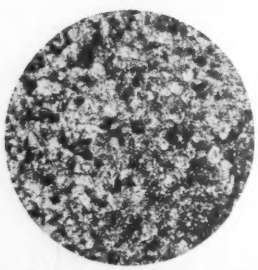


Fig. 3. Alloy Steel 30X pickled three hours in Rodine inhibited acid bath to which salt (NaCl) was added. The surface presents a uniform shiny crystalline structure — a good surface for drawing.

And Provide a Better Surface for Lubricating and Drawing

Metal waste is never justified and especially now when war production is requiring the major portion of the Nation's output.

RODINE remarkedly reduces the attack of the acid on the metal and provides a clean smooth surface. Compare the surface in figure 2 pickled with Rodine for three hours with that of figure 1 pickled in an uninhibited bath for only one hour.

The use of common rock salt along with the RODINE in a sulphuric acid bath further reduces the attack and provides a finely crystalline surface to hold lubricants as shown in figure 3.

RODINE in the pickle bath confines the acid action to its prime purpose—removal of scale—and thus minimizes acid attack on the clean metal thereby overcoming deep pitting and embrittlement.

There are types of RODINE suited to the varying pickling problems. The experience of ACP Technicians is at your service to recommend the Rodine and method of application best suited to your needs.

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D-1

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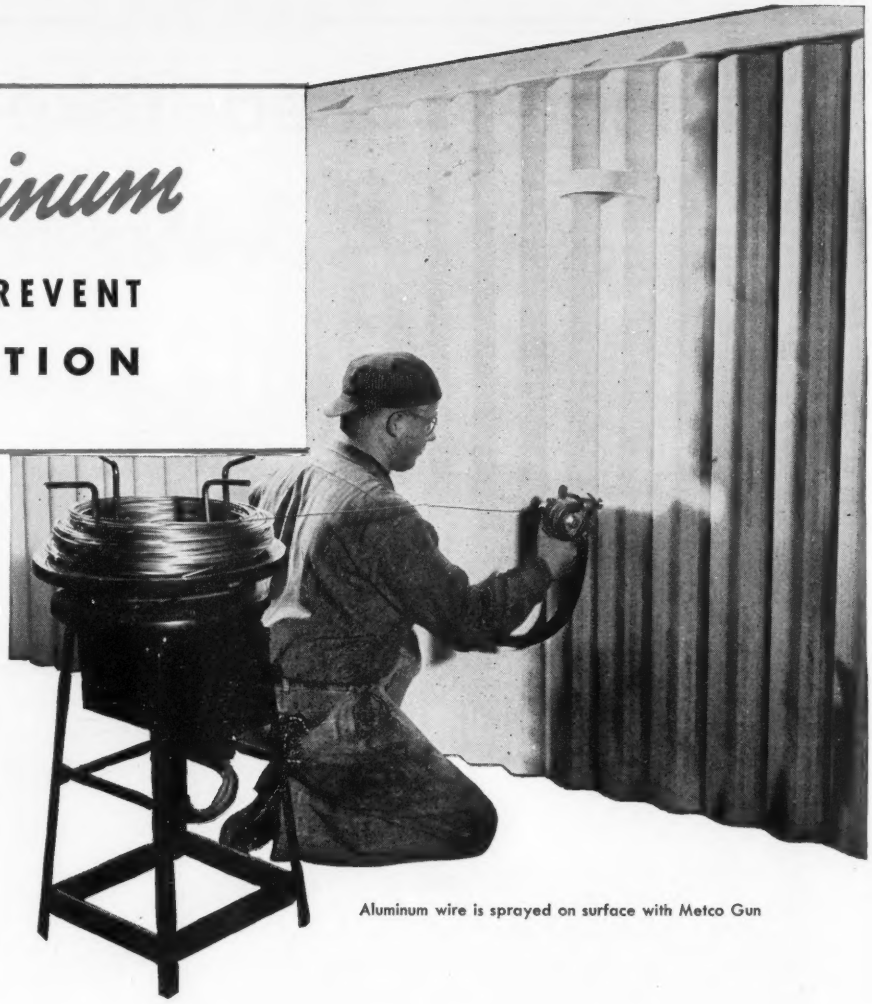

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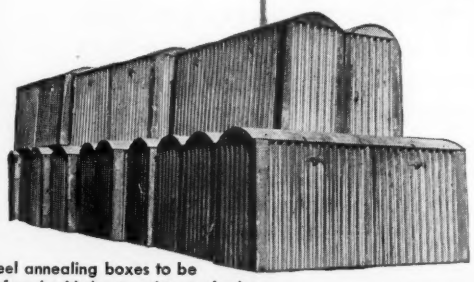

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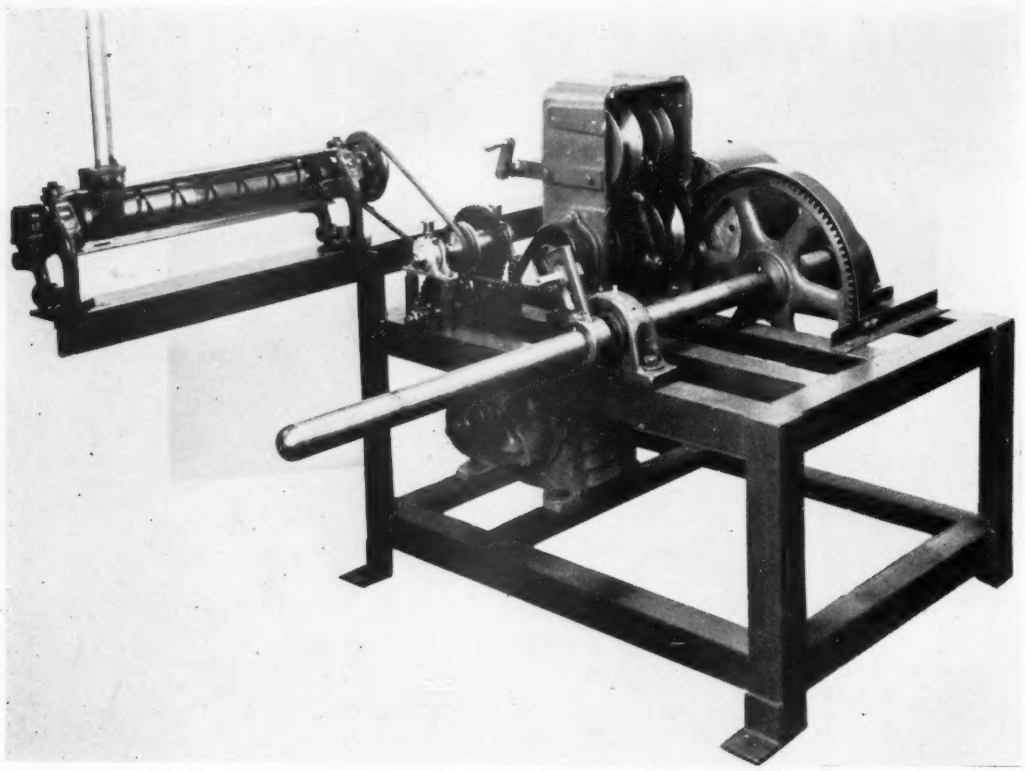

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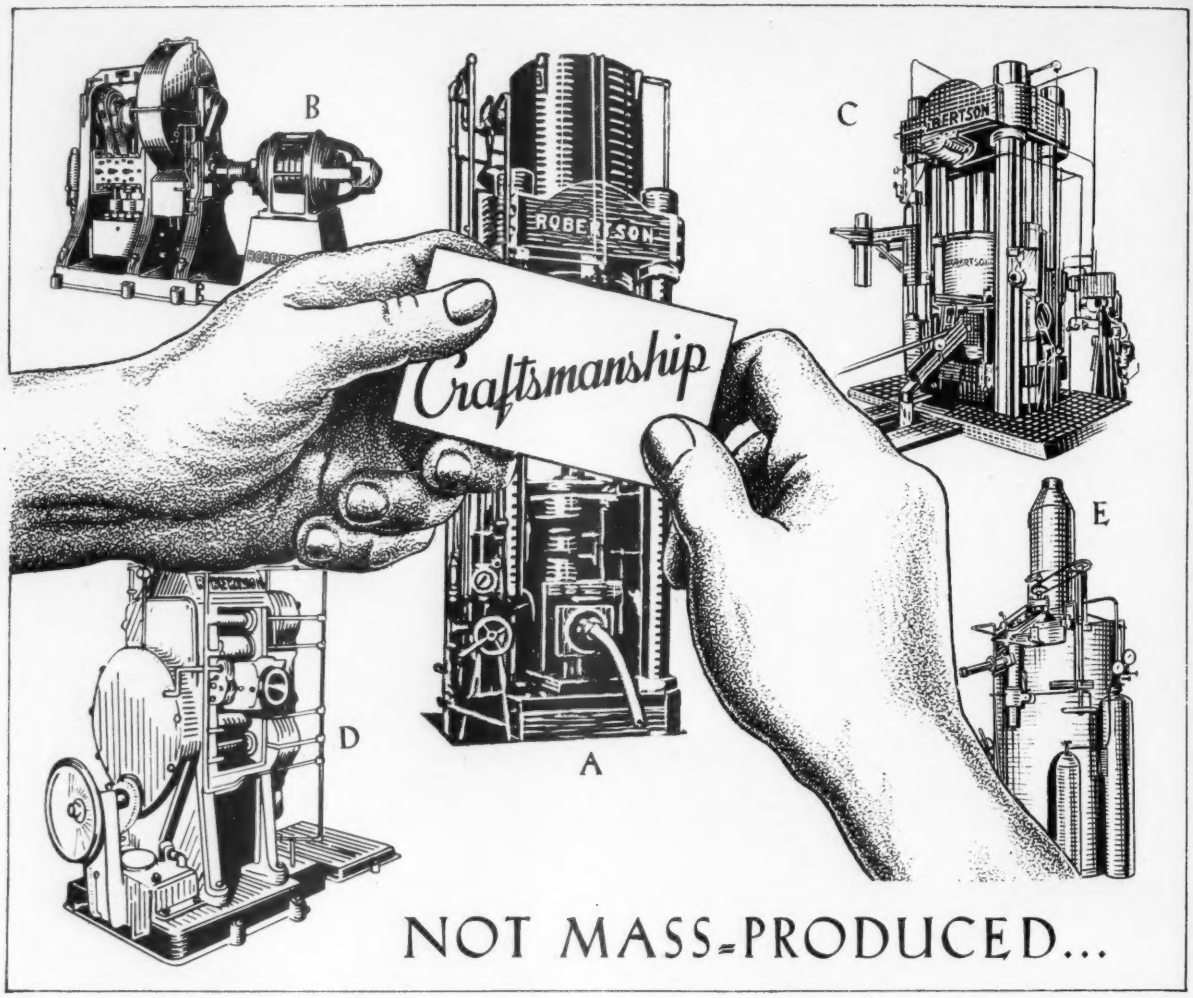

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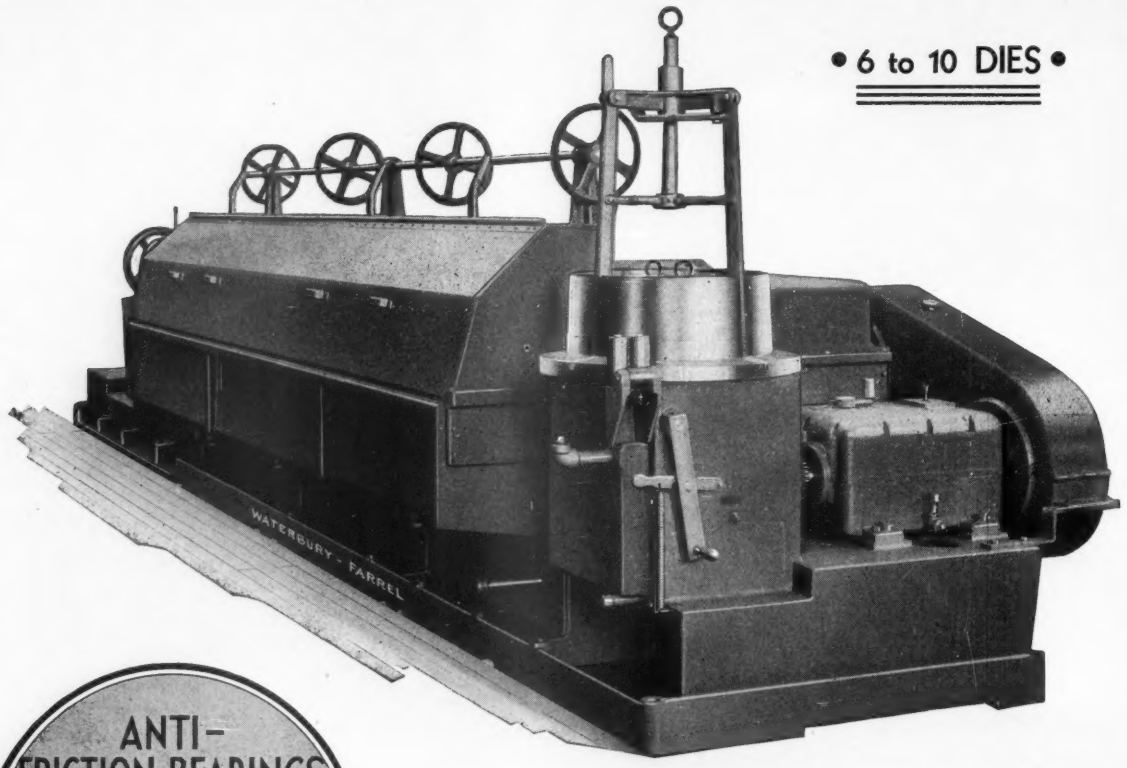

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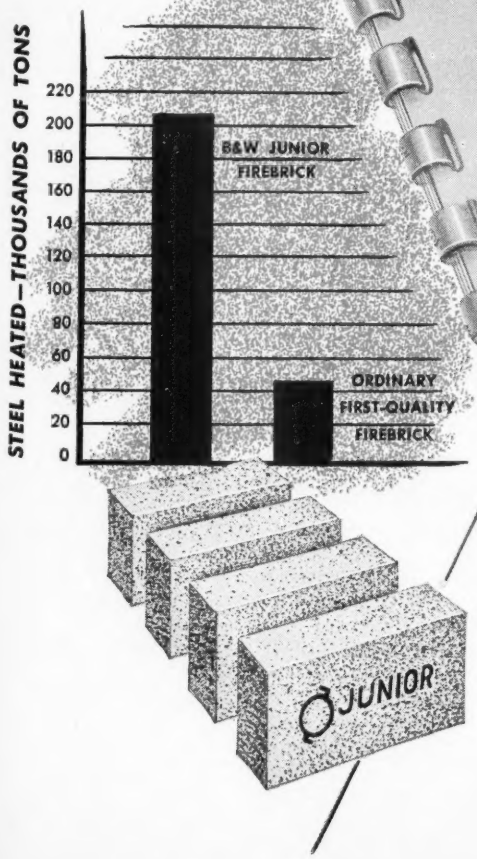

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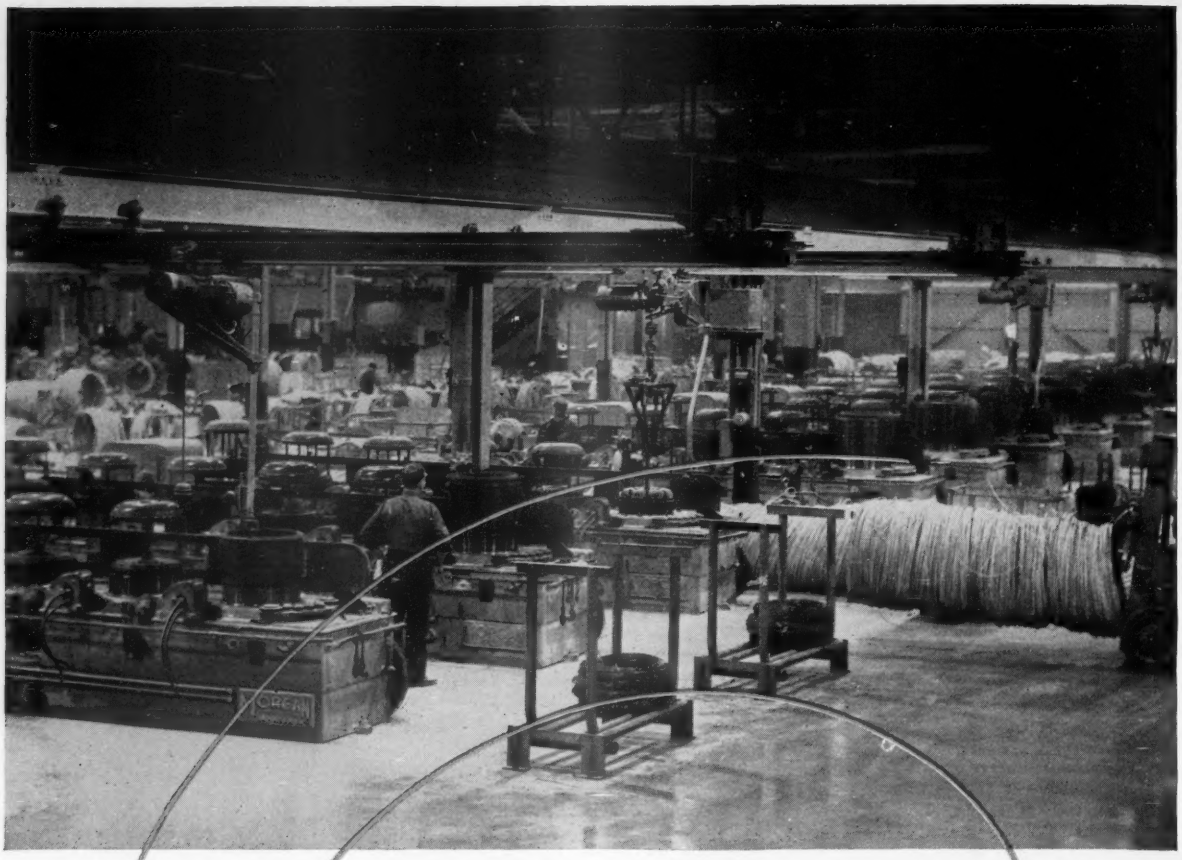

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip, Wire and Rod Products and Insulated Wire and Cable

DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 JULY, 1945 No. 7

Designated as
Official Publication By The Wire Association

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Publication Office: Stamford, Conn.
Executive Office: Stamford Trust Co. Bldg., 300 Main St., Stamford, Conn.

Annual Subscription, U. S. $5.00, Canada $5.00

50 Cents a Copy in U. S. Issued Monthly Foreign, $7.50

October Convention Issue $1.00 a Copy
January Convention Discussions Issue $1.00 a Copy

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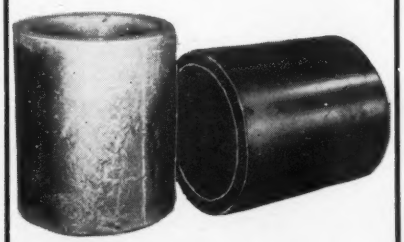

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WIRE AND WIRE PRODUCTS

A monthly publication devoted to the production of Wire, Rod and Strip.
Wire Products and Insulated Wire and Cable.
DRAWING — ROLLING — EXTRUDING — FORMING — FABRICATING

Vol. 20 JULY, 1945 No. 7

The Successful Finishing of Electrically Insulated Wire and Cable

By Ralph C. Ellams,
Supervisor, Electrical Coating Department,
Roxalin Flexible Finishes, Inc., Elizabeth F, New Jersey.

Published in Two Sections

Parts I and II published in this issue.
Part III will be published in August.

✦ ✦ ✦

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CONCLUSION

✦ ✦ ✦

RALPH C. ELLAMS

Mr. Ellams has been actively engaged in the protective coatings industry for twenty-three years, the last ten of which have been in association with Roxalin Flexible Finishes, Inc., in the capacity of Supervisor of Electrical Coating Development. This Department engineers protective coatings for specific applications in the electric wire and cable industry. It adopts coatings to factory procedure and supplies technical service.

Introduction

MANY articles covering the application of industrial protective coatings have been published. There seems, however, to be a dearth of written information concerned with the technical aspects of the application of finishes to electrically insulated wire and cable. This article is being undertaken with the feeling that an assembly of such information will be of use to the many operators, foremen, chemists and engineers engaged in the manufacture and finishing of wires and cables.

✦ ✦ ✦

IT is fully appreciated that the specialized group to which this writing is directed has, by its collective experience and case histories, supplied the data from which these principles are derived. Regardless of the physical set-up of the factory, the same basic principles apply, but are utilized through individual adaptation.

Designated as Official Publication by The Wire Association

THE observations which follow will be limited to those saturants and surface coatings which are deposited from solution. None of the references apply to the 100% solid hot melt compounds.

✦ ✦ ✦

IN order that the various operations may be followed in logical sequence, the writing will be divided into three parts. These will be presented in the order indicated in the sub-title.

✦ ✦ ✦

Part I—Handling of the Protective Coating Prior to Application

IT is a matter of simple logic that the series of operations which enter into the successful application of insulated wire finishes start immediately that the finishing material is received by the wire manufacturer.

✦ ✦ ✦

Containers:

SINCE most electrical cable coatings are shipped in 55 gallon returnable drums, these observations apply to this volume container. Smaller containers such as five gallon cans are used only for trial lots or specialties and this volume offers negligible difficulty in handling.

✦ ✦ ✦

Temperature:

LARGELY due to the excellent quality of raw materials furnished by the chemical manufacturers, modern protective coatings for insulated wire are relatively chemically stable at temperature ranges encountered in the temperate zones.

✦ ✦ ✦

Effect of Low Temperature:

EXTREME cold, however, increases viscosity to an extent which may practically solidify certain lacquers, the composition or application performance of which, prohibit the incorporation of desirable preventative ingredients. Materials received in cold weather should be maintained at room temperature or for quicker results, at temperatures up to 100°F. until heat transfer has taken place throughout the entire volume. This may take from one day to one week depending on the original temperature of the lacquer and that of the storage room. In this connection, we should give consideration to the following facts:

(1) The thermal conductivity of insulated cable coatings is low.

(2) Because of the normal high viscosity of the majority of these finishes, very little assistance to temperature uniformity is supplied by convection.

(3) Because of the high viscosity, the obtaining of temperature uniformity by agitation, in most cases, is impracticable.

✦ ✦ ✦

Effect of High Temperature:

IT is well known that many finishing materials whose heavy application consistency is derived from inherently high viscosity bases, have a tendency toward viscosity reduction in storage even at normal temperatures. This condition is aggravated by elevated temperatures; therefore, it is most advisable to store such materials inside or at least in the shade during the summer months.

✦ ✦ ✦

APART from the permanent viscosity drop which may occur, the immediate and perhaps temporary viscosity reduction resulting from high temperature may adversely affect the coating properties of the finish.

✦ ✦ ✦

WELL planned inside storage reduces application problems and complaints and has the advantage of maintaining lot number identification markings on containers.

✦ ✦ ✦

Storage Time:

IN addition to consideration of the effect of temperature during storage, serious thought should be given to the physical disposition of each new shipment of coating material as it is received.

✦ ✦ ✦

PROPERLY formulated finishes store exceedingly well, but they cannot reasonably be expected to maintain their original properties indefinitely. It is, therefore, to the mutual benefit of consumer and supplier that lots of material be used in the order in which they are received.

IT is true that in a busy and overcrowded factory, this may be inconvenient in some instances. I believe we generally agree that this physical inconvenience is slight in comparison with some thousands of feet of ruined product, an irate engineer and a worried supplier who finds the "defective material" was shipped three years ago while the last shipment went last month.

✦ ✦ ✦

FORTUNATELY, coating material is used quickly and is handled intelligently, therefore, cases such as the foregoing are rare. The possibility of such happenings, however, should not be overlooked.

✦ ✦ ✦

Transfer to Reservoir:

THE method employed for transferring the coating material from the shipping container to the coating reservoir depends on the physical makeup and operation cycle of the apparatus. Where the coating tower is not run continuously, it is common practice to withdraw from the drum into a smaller vessel and transfer the lacquer into the coating pot through an opening in the top. Even with care, this is not a very satisfactory procedure. The transfer vessel usually develops a skin which subsequently may be partially dissolved and introduced into the lacquer pot. This skin may pass through the gasket and form a gelatinous elevated streak on the surface of the coating. In the event that the flaw is not properly dried on its travel from gasket to sheave, it may be transferred to the sheave and mark the coating which follows. If the flaw is on the final coat, it may cause sticking on reeling.

✦ ✦ ✦

THIS "open" method of handling high viscosity finishes has many other disadvantages. The rapidity with which the solvents evaporate lowers the temperature below the dew-point and precipitates moisture on the surface of the lacquer in the open container. A white surface skin evidencing solid precipitation is the result. Drippings from the drum valve usually hang to the floor and the odor of the volatile solvents is noticeable. True, these conditions are exceptions. They are unnecessary nuisances which may easily be eliminated.

CLOSED systems should be used on all coating towers regardless of size. Uniformity of product, economy of operation, cleanliness of apparatus and freedom from objectionable solvent odors are the benefits derived from the closed system.

✦ ✦ ✦

THE ideal system pipes the lacquer directly from the drum to the applicator. Where machines are run continuously on the same type of strand with the same coating material, a number of drums may be combined in a large volume tank fitted with a very slow agitator. The agitator need not operate continuously, but only occasionally to reincorporate thinner condensate.

✦ ✦ ✦

EITHER gravity feed or pumping may be used to transfer the lacquer to the applicators. An intermediate reservoir may be held at constant level to maintain an even pressure if required by the construction of the applicators. Regardless of the particular design of the apparatus most of these principles can be used although mechanical variations may be advisable to obtain greatest efficiency.

✦ ✦ ✦

THE closed system has one particular advantage apart from those previously mentioned. No thinner is necessary as there are no evaporation losses.

✦ ✦ ✦

CONSTANT operating viscosity is maintained for indefinite periods eliminating the messy procedure of trying ineffectually to stir thinner into a high viscosity lacquer through which wire is passing.

✦ ✦ ✦

THINNER addition "on the job" is very often a hit or miss affair. Uniformity of finish can be obtained only if viscosity and solid content of the coating material remain relatively constant throughout the operation. The manufacturer of protective coatings is much more concerned with supplying engineered finishes of satisfactory and uniform properties than with selling thinner subsequently lost through evaporation.

✦ ✦ ✦

Part II—Mechanics of Application

Reservoirs

MANY types of lacquer vessels are used with varying degrees of success. The basis of good design permits as short a length of contact with the coating material as is consistent with good "pick-up."

✦ ✦ ✦

LOWER sheaves should not be immersed except in saturant application as discussed under "Application." Immersion of sheaves in the finish coating causes execessive contact which is responsible for many faults listed in the section entitled, "Production Problems and their Solution."

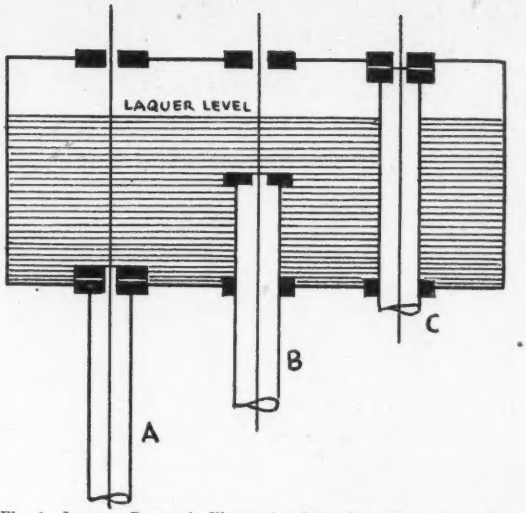

Fig. 1. Lacquer Reservoir Illustrating Tube Control. ✦ ✦

✦ ✦ ✦

SOME lacquer vessels use the "tube control" for adjusting the time the insulated conductor contacts the lacquer. Figure I illustrates this principle. This form of construction is also used where machines are not run continuously. In periods of inactivity, it is desirable to protect the finish from direct contact with the lacquer. The tubes are then raised as in "C" which prevents marking of the coating.

✦ ✦ ✦

WHERE the normal pressure of the volume of the coating material in the vessel is the means of maintaining contact with fast-moving strand, a longer contact distance is necessary than when a slight pressure is used. Such slight pressure would be obtained by difference in level between the drum and the applicator of closed type.

✦ ✦ ✦

CONTAINERS of various dimentions incorporating the "tube control" feature have proven quite satisfactory. Either finger cots or compression gaskets are used for application while felt or leather is used for the bottom lacquer retaining gasket.

✦ ✦ ✦

TUBULAR reservoirs connected by manifold to the common source of material supply are the most economical and cleanest form of lacquer vessels. Only a small amount of material is contained and the contact distance is short. For continuous trouble-free operation, this form of reservoir and closed system deserve careful consideration. (Figure 2).

✦ ✦ ✦

THE viscosity of the material also influences the time necessary for

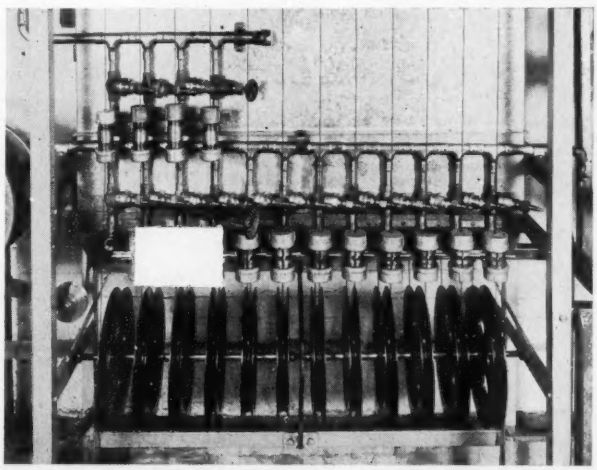
Fig. 2. Manifold and Tubular Applicators. ✦ ✦ ✦ ✦

wetting the wire to obtain pick-up. Low viscosity materials wet well while high viscosity lacquers sometimes permit the wire to "channel" especially if the speed is too high. In general, where no actual pressure is used, eight inches of contact is sufficient to cause satisfactory pick-up over a wide range of wire sizes and speeds.

✦ ✦ ✦

Applicators

GASKETS, finger cots, wipers, and dies are a never ending topic of discussion among men engaged in coating wire. Many individual preferences are expressed, influenced in each case by the particular wire being coated or the operators' past experience. For this reason, it is extremely difficult to state which is the best system. All the forementioned types are suitable. The composition so far as durability is concerned rests on the skill of the formulator in choosing a tough, yet flexible and solvent resistant compound.

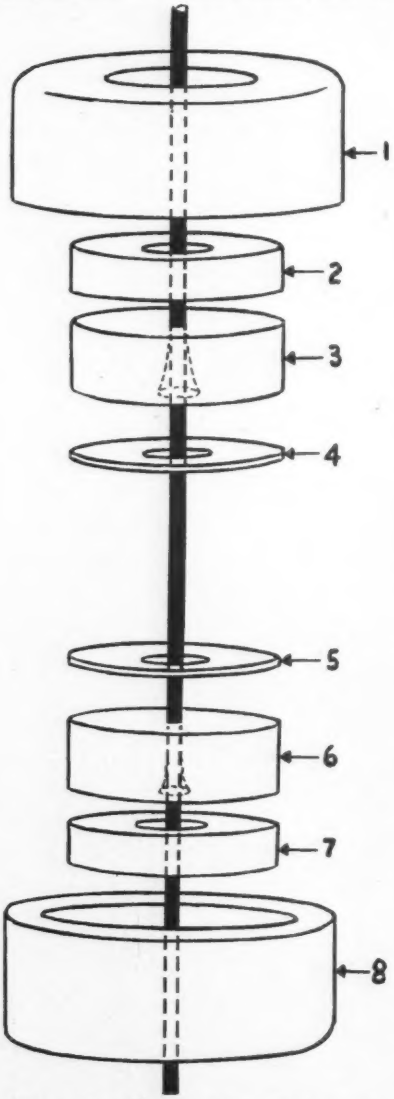

Fig. 4. Exploded view of Caps, Washers and Gaskets. ✦ ✦ ✦ ✦ ✦

✦ ✦ ✦

COMPRESSION gaskets may be made from rubber stock, neoprene or like elastomeric compounds. Felt has also been used for many years. The gasket form of "applicator" is discussed first because it seems to be the general opinion and one in which this writer concurs, that gaskets are most durable and constitute the best means of controlling the finish application. At this point, it is fitting to mention that on some strands of extremely uniform diameter, steel dies of increasing I. D. are indicated. Certain local conditions require the use of flexible gaskets on a number of coats, the finishing coats being applied through the steel dies.

✦ ✦ ✦

THE obvious advantage of the elastomeric gasket is its adjustability when properly supported. It overcomes the drawback of the otherwise excellent steel die in its ability to permit the passage of braid faults, rough splices or diameter irregularities.

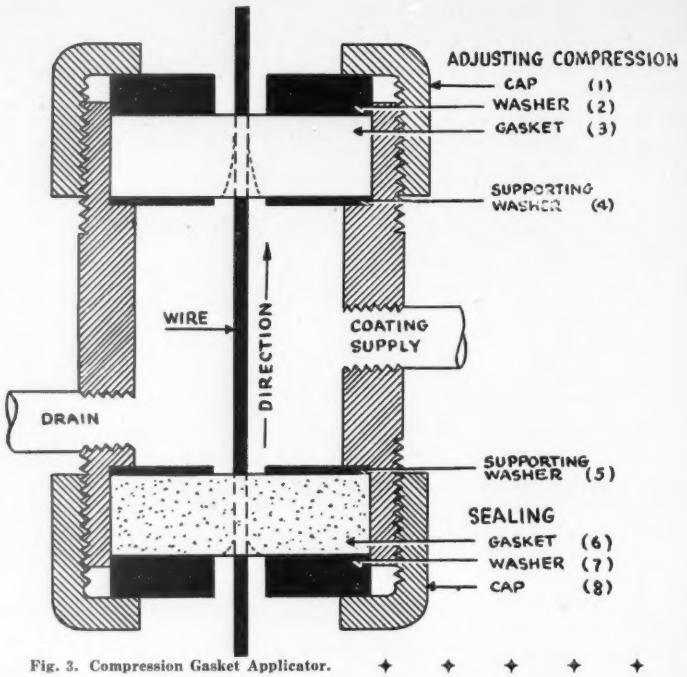

Fig. 3. Compression Gasket Applicator. ✦ ✦ ✦ ✦ ✦

FINGERTIP control is obtained through a well designed compression gasket applicator. Figures 3 and 4 gives this writer's impression of the principles of construction which contribute to the following desirable characteristics:

(1) Gasket compressibility without orifice distortion.

(2) Under compression, the gasket can move only toward the wire.

(3) Due to the fingertip control, wires of considerable diameter range may be coated without changing gaskets.

(4) Considerable wear may be tolerated before replacement is necessary.

✦ ✦ ✦

THE physical shape of the gasket is of utmost importance if a uniform smooth wire surface is to be obtained. Lacquer should be applied to the braid in a method analogous to the trowel application of a plaster finish coat to a wall. It should not be "shouldered" off. Countersinking is obviously indicated and practice justifies this construction.

✦ ✦ ✦

A ROUGH orifice causes streaks in the finish — similar to those left by coarse felt wipers and also forms curlicues which catch on the

wire and either cause faults or stick to the sheaves. The orifice should be very smooth and at the point of wire egress should be clean cut with no rough edge. A smooth finish is the result.

✦ ✦ ✦

VERY often the question is raised as to the optimum length of contact between the gasket and the surface being coated. This does not seem to be critical on most wire surfaces. Smooth coatings are made with both short (1/16″) and long (1/2″) contacts.

✦ ✦ ✦

THE illustration shows a 1/8″ surface contact above the countersinking. This dimension should be satisfactory for practically all strand diameters.

✦ ✦ ✦

THE Roxalin Electrical Coating Development Laboratory has recently investigated the use of *compar gaskets. This material is insoluble in organic solvents, has excellent abrasion resistance and may be formulated to have physical properties ranging from rubber-like consistency to comparative hardness.

✦ ✦ ✦

MOLDING of the orifice produces clean cut edges and smooth walls. The flexible composition permits a wide range of wire sizes to be run without a change of gaskets. Unusual durability is a characteristic of this material. Gaskets, for the coating of large diameter braided tubing, have been used for six months without replacement. Their present appearance indicates at least another six months of service.

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FURTHER investigation is being carried on but the results up to the present time show that properly formulated compar is a most satisfactory gasket material.

✦ ✦ ✦

THE preceding considerations apply mainly to the finishing coats. Saturants applied from solution offer a somewhat different problem as they are rarely multiple coated. They function inside the braid, not on its surface. Therefore, a surface application of saturant is poor economy. Furthermore, if too much saturant is applied, contamination of the finished coating may occur when the saturated wire is passed through the lacquer vessel.

SATURANT constitutes the first application to the braid. Since it is a low viscosity material, it lubricates but slightly the highly abrasive braid. Wearing of the gasket material is a real problem in this application. Finger cots are unsuitable as are any other type of non-adjustable wiper. An adjustable gasket of good abrasion resistance is essential. Either felt or compar may be used successfully.

✦ ✦ ✦

BEFORE leaving the subject of the gasket form of applicator, a word about the lower gasket is in order. Any composition with a high co-efficient of friction should be avoided.

✦ ✦ ✦

FELT gaskets are ideal for this purpose. They have low co-efficient of friction, fairly close texture, compressibility and good durability. The felt gasket may be supported in the same manner as the more elastic coating gasket. In the application of saturant, the sheave may be partially immersed in the bath as the lower gasket may not prevent the low viscosity saturant from escaping.

✦ ✦ ✦

THE subject of the adjustable gasket has been covered in some detail because of its obvious advantages. Finger cots are still used for coating many insulated conductors and particularly for sleeving which has no supporting inner core. In general poor durability and lack of film thickness control are the principal drawbacks of this form of applicator. The rubber, latex or synthetic elastomer finger cot is used mostly where the lacquer viscosity is low and the speed not too great.

✦ ✦ ✦

WIRE moving through lacquer carries it to the orifice and creates pressure at this point. This pressure exerted on the walls of a finger cot vulnerable to solvent action, causes bulging and sometimes bursting. It has been suggested that strands of uneven diameter or poor concentricity may be coated more uniformly when the softer finger cot is used and this is true in some instances.

✦ ✦ ✦

ON the other hand, a few of the first coats applied through a fairly tight adjustable gasket of flexible construction usually smooth the irregularities so the remaining coats form a uniform surface. This is analogous to the application of a primer or filler coating to rough metal for sanding to smoothness before the application of the final decorative or protective coating.

✦ ✦ ✦

Drying

THE term, "drying" herein used means simply the removal of volatile solvents from the solid portion of the finish. Oxidation or polymerization describes the chemical or physicochemical changes that may be produced in deposited films after the evaporation of the volatile portion.

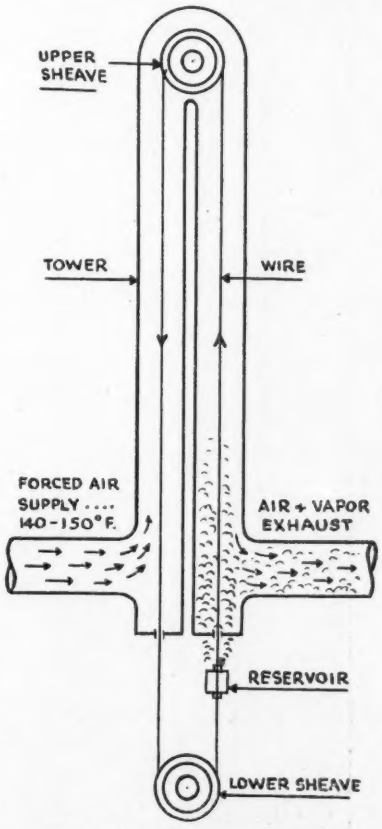
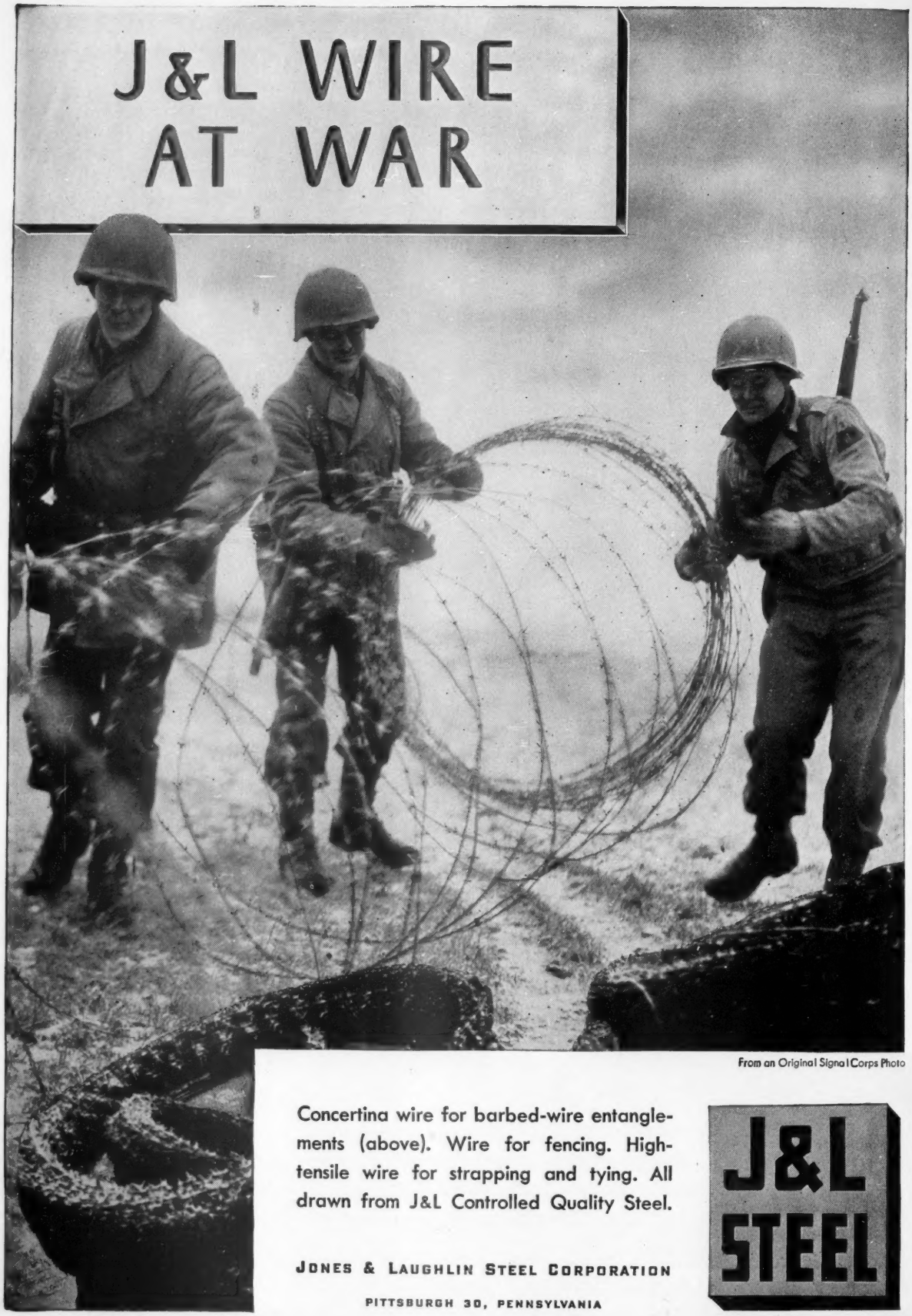


Fig. 5. Principle of Forced Air Convection Counter to Direction of Wire Travel. ✦

(Please turn to page 520)

* **Resistoflex Corp., Belleville, N. J.**

J&L WIRE AT WAR



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Toroidal Winders

Dr. F. E. Planer,
B.Sc., M.Sc., A.C.G.I., Ph.D. (London)
Kensington, High Street, London, W. 8, England

Introduction

THE rapid development of electrical communications during the last few years has brought with it a greatly increased demand for toroidal coils and transformers. Although automatic machines for the winding and taping of such coils have been in use for some time, the exacting requirements of modern circuit technique and the growing importance of coils of this type, particularly at supersonic frequencies, have led to a renewed study of toroidal winding machinery.

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REFERENCES to machines of this type in the scientific literature are scarce, and it is believed therefore that a general treatment of their principles will be of interest. In particular it is proposed to deal with some of the design problems in connection with the winding at high speeds and with fine gages of wire. The discussion of the practical aspects is based on a graphical method representing the operating conditions of eccentric ring winders which in turn is derived from the mathematical relations governing the winding mechanism, and its geometry.

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Principle

THE simplest form of toroidal winder is the shuttle machine. Here the winding material e.g. copper wire, is stored on a small revolving magazine mounted on a track surrounding the core cross section. The end of the wire is attached to the core, and as the magazine is made to travel around the toroid, wire is drawn from it and transferred to the core.

This subject is one of practical interest at the present time and the theory developed in this article is regarded in England as the basis of toroidal winding practice.

THIS type of machine is still used for the winding of toroidal coils of large diameter and for similar applications. No particular difficulties are involved in its design which follows established principles.

✦ ✦ ✦

FOR other applications, however, where the central space of the core ring is small in relation to the amount of winding material to be applied an alternative principle is employed which possesses outstanding advantages. This more recent method makes use of a ring shaped magazine, and it is with this type of machine that the following treatment is concerned.

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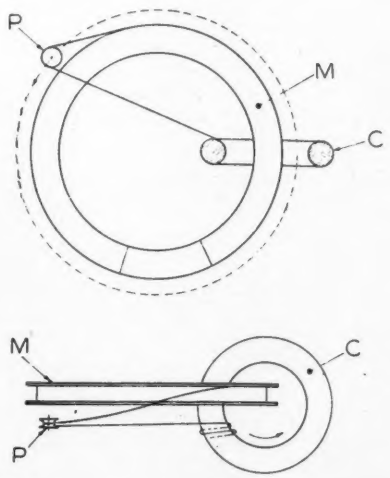

Figure 1

✦ ✦ ✦ ✦

THE great majority of applications for electrical communications equipment involve core rings ranging from diameters of about 1 to 3 inches. Since the amount of wire to be wound on to these cores is frequently considerable it would be uneconomic to attempt to store this on a magazine small enough to pass through the ring centre. Not only would this require frequent re-loading but also the wire would have to be wound on a very small radius with possible damage to the insulation. These difficulties are overcome by the ring machine where the winding material is stored on a comparatively large channel enclosing the cross section of the core. A machine of this type is shown diagramatically in fig. 1. M is the magazine ring and P a pulley which travels in a path parallel to that of the ring. The pulley serves to lift the wire out of the magazine, and guides it on to the core. Both pulley and ring are revolving in the same direction, as indicated by the arrows, although not with the same velocity. In the arrangement shown the drive is applied to the pulley, with the magazine ring following as wire is drawn from it.

✦ ✦ ✦

AN alternative arrangement would consist in applying the drive to the ring instead of to the pulley, with the latter idling. For reasons to be discussed later, the first mentioned system has proved the more satisfactory and the following considerations will in the first instance deal with the case of a uniformly driven pulley.

✦ ✦ ✦

IT will be seen that the carrying capacity of the magazine is determined first of all by the inner diameter of the completed coil, and the space occupied by the ring together with the pulley and its mountings.

Secondly the amount of wire which can be stored on the ring will depend on the diameter of the latter. Since it is desirable to allow for the winding of coils having very small inner diameters, as well as to carry a maximum amount of material on the ring in order to reduce the number of times the latter has to be re-loaded, a narrow magazine ring of large diameter would appear to fulfil the requirements. Now, from an inspection of the diagram fig. 1, it is apparent that while the wire tension is constant if the ring diameter is the same as that of the core ring, there will be cyclic variations if the former exceeds the core diameter. The variations in the tension of the wire become more serious as the ring diameter—and hence the eccentricity—are increased, and it is as a result of these conditions that limits are imposed on the winding speed, gage of wire, and size of core. These various factors will be analyzed in the following trea'ment.

✦ ✦ ✦

Theoretical Considerations

FIG. 2 shows diagramatically an instant during the winding process corresponding to the configuration

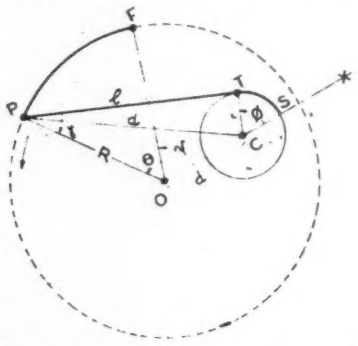

Figure 2

✦ ✦ ✦ ✦

of fig. 1. The pulley P is driven in the direction of the arrow and a length of wire FPTS is being transferred on to a core of radius r. The magazine ring coinciding with the path of the pulley is represented by a circle of radius R and centre O.

✦ ✦ ✦

AS P advances the end F of the wire reserve PF follows in the same direction, and since the end of the wire is attached to the ring, i.e. no slippage being permitted, the magazine ring will revolve in the direction of the pulley.

THE instantaneous positions of pulley and ring may therefore be described in polar co-ordinates by $R\underline{/\theta}$, and $F\underline{/\theta}$, respectively. Since the total length of wire S-F remains constant during the winding process we may write

$$\phi r + l + R(\theta - \psi) = k \qquad -(1)$$

where the angles ϕ, θ, and ψ may include constants depending on the instant of starting. The angular displacement of F, i.e. the travel of the magazine ring from the reference line OX for an advance θ in the position of the pulley is therefore given by

$$\psi = \frac{1}{R}(r\phi + l) + \theta + k' \qquad -(2)$$

where k′ is a constant.

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EXPRESSING ϕ and in terms of the given parameters and the variable θ, substituting in (2), and differentiating with respect to θ gives the rate of displacement of the magazine ring:—*(See formula at bottom of page).

✦ ✦ ✦

IT may be shown that by several transformations involving the variable quantities l and d, the intercepts of the perpendicular from C onto the continuation PO, and the angles TPC and CPO, equation (3) may be written

$$\boxed{\frac{d\psi}{d\theta} = 1 + \sin\gamma} \qquad -(4)$$

where γ is the angle OPT.

✦ ✦ ✦

THIS very simple and practical relation therefore describes the angular velocity of the magazine ring at any instant, if the pulley is driven at constant velocity. The angular velocity of the magazine ring with respect to the pulley is merely sin γ.

✦ ✦ ✦

A FURTHER differentiation of (3) with respect to θ will give the acceleration of the magazine ring, and hence an expression for the force acting on the wire at any instant of the cycle:— **(See formulas at bottom of page).

✦ ✦ ✦

IN fig. 3 are plotted for a particular winding arrangement the velocities and accelerations of both the pulley and drum for one revolution of the pulley around the core — against abscissae of θ. In the example chosen the ratio of the radii of pulley path and core were 9 : 1, and the relative eccentricity a/R was 0.7.

✦ ✦ ✦

WHILE the velocity of the pulley is of course represented by a straight line parallel to the θ — axis, it is seen that the drum velocity varies appreciably over the cycle; reaching a maximum of approximately 1.8 times the velocity of the pulley at an angle of 210° and a minimum of 0.24 at 115°. It is apparent further that the mean velocity of the drum exceeds that of the pulley, the amount of wire unwound from the drum resulting in a correspondingly larger over-all displacement. This is shown more clearly by the integrals of the above functions representing the displacements of pulley and drum.

✦ ✦ ✦

THE differential of the drum velocity function shows clearly the considerable acceleration which is being imparted to the drum at every revolution.

---

* $$\frac{d\psi}{d\theta} = \frac{rR + a\left(\sqrt{[a^2 + R^2 - 2aR\cos\theta - r^2]}\sin\theta - r\cos\theta\right)}{a^2 + R^2 - 2aR\cos\theta} + 1 \qquad -(3)$$

**
$$\frac{d\psi}{d\theta} = \frac{2aR\sin\theta\,(ar\cos\theta) - rR - a\sin\theta\sqrt{a^2 + R^2 - r^2 - 2aR\cos\theta}}{(a^2 + R^2 - 2aR\cos\theta)^2} +$$

$$\frac{ar\sin\theta + a\cos\theta\sqrt{a^2 + R^2 - r^2 - 2aR\cos\theta} + \dfrac{a^2R\sin^2\theta}{\sqrt{a^2 + R^2 - r^2 - 2aR\cos\theta}}}{a^2 + R^2 - 2aR\cos\theta} \qquad -(5)$$

IN figure 4 the absolute and relative velocities of pulley and drum have been re-plotted in the form of polar diagrams. This method of representation shows the velocity of the drum directly for any position of the pulley, and all essential information relating to the winding process may be derived from this diagram. If the path of the pulley is made to coincide with the pulley velocity diagram, the construction of the polar diagram becomes very simple; for the instantaneous drum velocity at any angle O is given merely by the length of the intercept of a perpendicular from the origin on to the line representing the wire from pulley to core, or its extension.

✦ ✦ ✦

THE curves b and c in fig. 4 therefore represent the relative velocity of the drum, b being positive and c negative with respect to the constant drum velocity. The difference in the areas enclosed by the two loops is a function of the amount of wire transferred on to the core per cycle. Curve d gives the absolute velocity of the drum.

✦ ✦ ✦

REFERRING now to the expressions (3) and (5), it may be shown that the positions of maximum and minimum velocity are given by $\gamma_1 = \sin^{-1}\left(\frac{a+r}{R}\right)$, $\theta_1 = \cos^{-1}\left(\frac{a+r}{R}\right)$, and $\gamma_2 = -\sin^{-1}\left(\frac{a-r}{R}\right)$ $\theta_2 = -\cos^{-1}\left(\frac{a-r}{R}\right)$, respectively.

The relative magnitude of these quantities are $\left(\frac{a+r}{R}\right) + 1$ for the maximum, and $\left(\frac{a-r}{R}\right) - 1$ for the minimum velocity, respectively. The acceleration of the drum at these two points is zero.

✦ ✦ ✦

THE maximum and minimum accelerations occur at the two instances at which the relative drum velocities are unity, i.e. at the angles $\sin^{-1}\frac{r}{a}$, and $-\sin^{-1}\frac{a}{R}$, respectively; They are given by

$$\frac{1}{R/\sqrt{a^2-r^2}-1} \text{ and } -\frac{1}{R/\sqrt{a^2-r^2}-1}$$

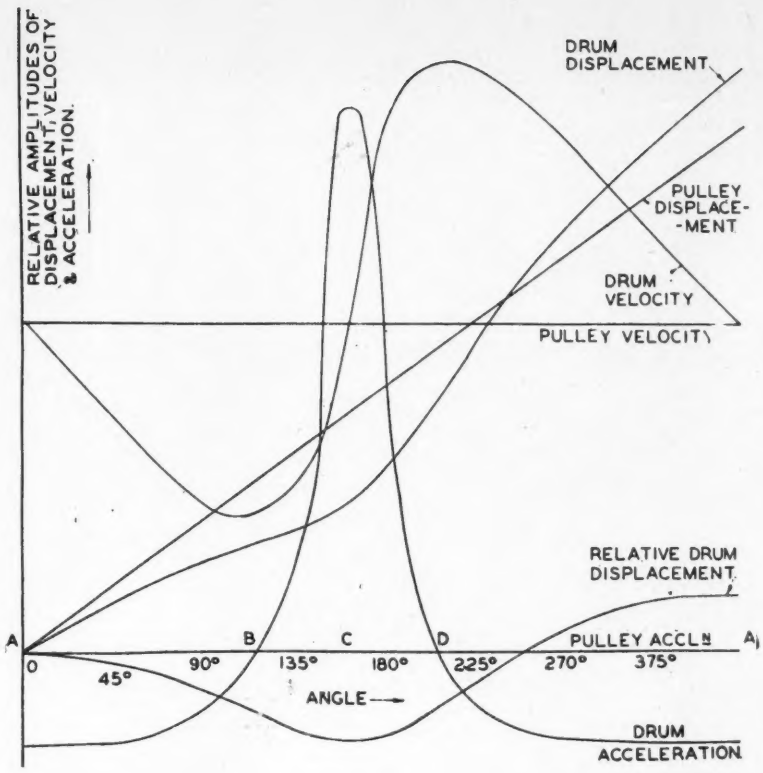

Figure 3 ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦ ✦

Conclusions

AN accurate knowledge of the operating conditions, as afforded by the foregoing analysis is essential in the design of efficient winding machines. Applying the principles outlined above to the question of the drive, it will be seen that in spite of the larger mass of the drum it is desirable to apply the drive to the pulley ring, and allow the magazine ring to idle.

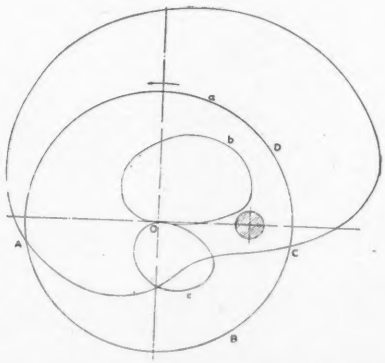

Figure 4 ✦ ✦ ✦ ✦

FIGURES 5a and b show the instantaneous positions of the pulley at the point of maximum acceleration for the two types of drive. In figure 5a the driving force is transmitted to the drum via the pulley, and it is apparent that the force required to drive the drum acts mainly in the direction of the wire. The wire tension will therefore be relatively small. If however the drive is applied to the drum, as in fig. 5b, only a small component of the force transmitted through the wire is available to drive the pulley ring, resulting in an appreciable tension. Experiments with the two types of drive confirmed these conclusions, there being frequent stoppages due to seizing of the rings and wire breakage in the case of a driven magazine ring.

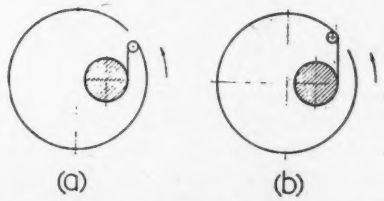

Figure 5 ✦ ✦ ✦ ✦

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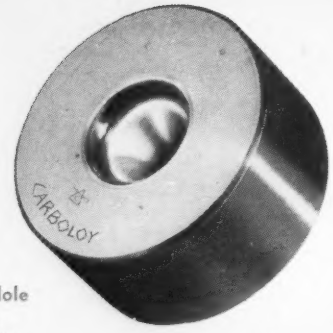

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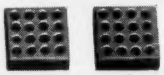

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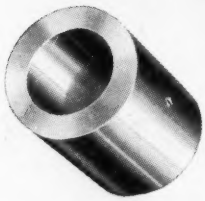

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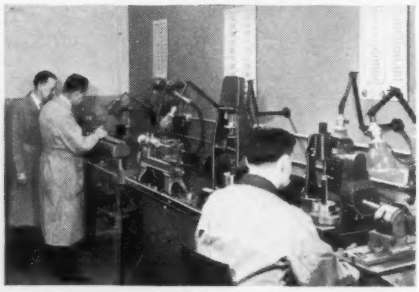

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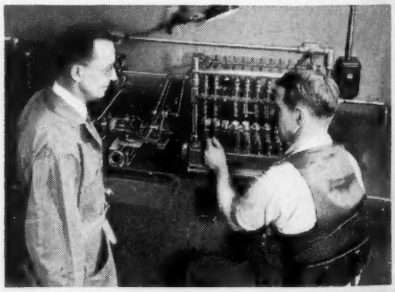

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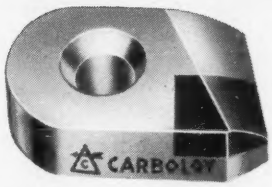

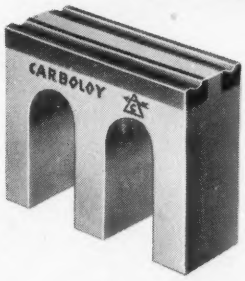

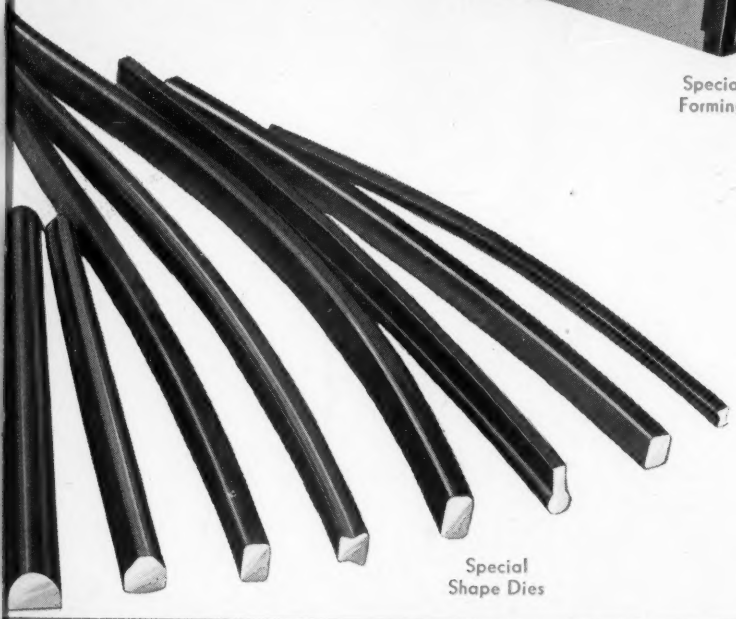

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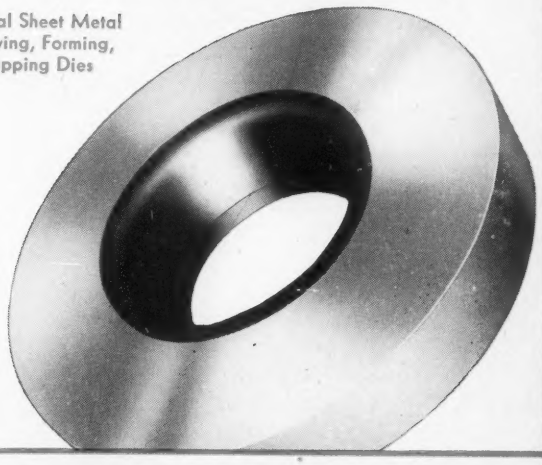

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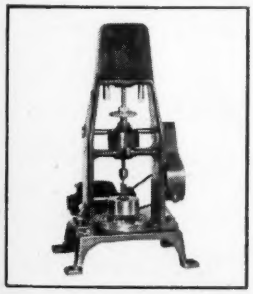

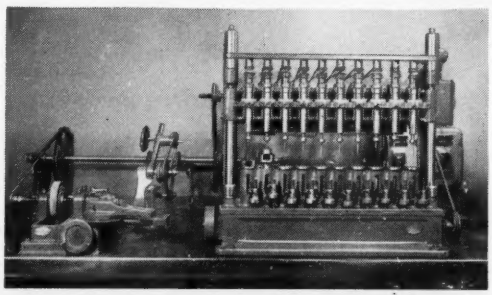

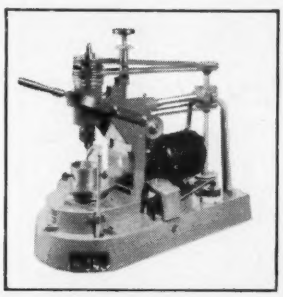

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A NUMBER of other points have to be considered in the design of machines suitable for winding at high speeds and down to very fine gages of wire. Apart from avoiding undue strain on the winding material it is very desirable to apply the wire evenly and to prevent slack turns which present a potential danger electrically, tending to cause short circuited turns due to damage of the insulation or open circuits due to breakage of the wire or of joints.

✦ ✦ ✦

THESE difficulties may be largely overcome by the use of one of the following methods. The simplest way of ensuring winding accuracy consists in providing for a periodical braking action on the drum during the deceleration period.

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THE instant at which friction should be applied in relation to the position of the pulley may be determined by the graphical methods outlined in the previous section. The brake may be operated electrically by means of a solenoid and armature, actuated by a cam mechanism in connection with the pulley ring. Fig. 6 shows a toroidal winding machine employing this principle.

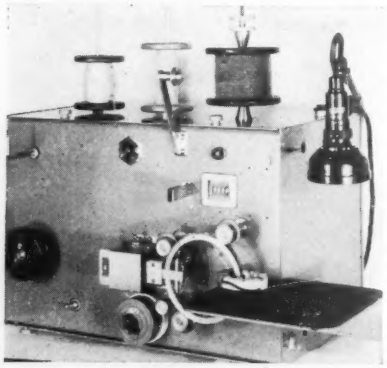


Figure 6. Automatic Toroidal Winder—employing electrical brake. ✦ ✦ ✦

IN another form of machine a number of cams designed in accordance with the polar diagrams were provided. A selector and gear mechanism permitted friction to be applied automatically to the drum at the correct rate and over a predetermined fraction of the cycle via a mechanical transmission system. A range of different cam contours were provided for use with various sizes of cores and windings.

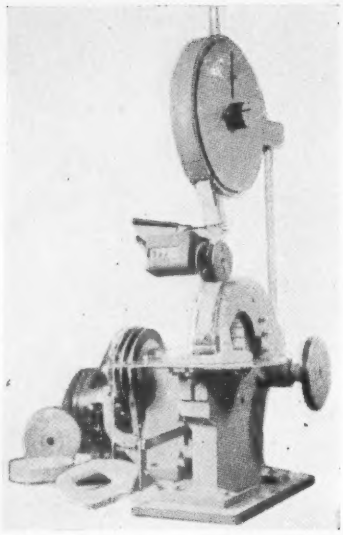


Figure 7. Toroidal Taping Machine. Reproduced by the courtesy of Frank Whitelegg, London N. 1. ✦ ✦ ✦

ANOTHER method consists in employing a flexible mounting for the pulley or a flexible drive to the pulley ring. In the former case the spindle of the pulley is arranged to move against the tension of a spring during the periods of acceleration. The inertia to be overcome will then be merely that due to the small mass of the pulley and its balancing spring, while the drum is allowed to rotate at substantially constant velocity. This arrangement is capable of winding at very high speeds.

✦ ✦ ✦

AN alternative method is to apply a drive of variable velocity to the pulley ring. The gear ratio should be selected so that for a particular winding arrangement the velocity of the drum remains substantially constant. There are of course difficulties in achieving this for a variety of cores and windings. When applied, however, to the design of a machine for a limited range of coils this method will give satisfactory results, the wire tension remaining approximately constant over the complete winding cycle.

✦ ✦ ✦

IN conclusion it may be mentioned that there are a variety of similar machines to which the above analysis may be applied. These include machines for the winding of tape or paper bands on to toroidal coils, rings of wire or cable, armature and field coils, motor car tyres, etc.

IN the case of toroidal taping machines only one ring is in general used. This ring is in a form of a closed channel and the tape is taken off towards the inside over a roller, through an opening at its inner face. In the velocity diagram the roller takes the place of the pulley while the drum in this case is represented by the tape reserve itself which is free to slip in the channel ring. Figures 7 and 8 show typical modern machines of this type. Some form of friction is generally applied on the outside of the "tape ring' to prevent slackness during the deceleration periods.

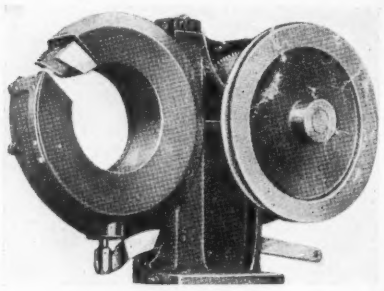


Figure 8. Field ..nd Magnet Coil Taping Machine. Reproduced by the courtesy of Electric Service Supply Co. ✦ ✦ ✦ ✦

FINALLY, similar considerations apply to the winding on cores of polygonal cross section, the most frequently encountered case being that of a rectangular section. In this case the edges may be regarded as instantaneous winding centres having zero dimensions. The polar diagram for an n-sided section will thus be composed of n sectors each of which is part of a different velocity diagram.

AD THOUGHT

ADVERTISING is a service to a magazine's readers. Methods, materials, and machinery are developing under the stress of war. Both editorial matter and advertisements keep you informed on what is happening in industry.

Patenting An Invention

By Royal R. Rommel,
of Lancaster, Allwine & Rommel, Patenting Attorneys, Washington, D.C.

The average person has but a vague idea of how to patent an invention, or the nature of a patent grant. This article, while rather elementary, will give to the average individual an outline of the nature of a patent right, and how to secure it.

The Nature of a Patent Grant

A PATENT in the United States is the grant to an inventor or his assignee, for a period of seventeen years, of a monopoly to exclude all others from making, using and selling the invention. The owner of the patent right may license others to make, use and sell the invention. The main object in granting patents is to stimulate invention and the development and progress of the useful arts. To that end the law requires that the inventor fully describe and particularly point out the novelty in the invention so that the public, after expiration of the patent, will know how to make and use the invention.

✦ ✦ ✦

Patentable Classes of Inventions Under the United States Laws

THE laws of the United States designate the following six classes of Inventions and Discoveries as patentable. It is not necessary for an inventor to know nor designate under which class his invention falls.

✦ ✦ ✦

1. An Art

THE term art as applied to a patentable invention has the restricted meaning of:—a **process**, or—a **method**. Process and Method inventions are of two species. First, those which are the most common, having to do with forces or elements producing **physical change**, such as chemicals, electricity, heat, light, pneumatics, hydraulics, metallurgy. An example of a metallurgical process would be that of treating metals such as in baths, heating etc. (for the purpose of improving or changing some physical characteristic thereof). Second, those having to do with **mechanical** process steps, such as, for example, a process of making expanded sheet metal.

2. A Machine

THIS class of patentable invention is most common. A machine is a device consisting of one or more elements which may be used to perform some useful work. The general idea of a machine is a device having a number of parts such, for example, as a wire drawing machine, a welder, cutting machines and implements, nail manufacturing machine, etc.

✦ ✦ ✦

3. A Manufacture

THIS class of invention (a manufacture) which insofar as patent law is concerned means some **device** having passive properties. That is, something which serves the convenience or comfort of a user, such, for example, as a nail, special form of wire, a spool, etc.

✦ ✦ ✦

4. A Composition of Matter

A COMPOSITION of matter is a combination of various ingredients, wherein, by reason of their association some new function is performed. The ingredients may be solid, comminuted, fluid or in gaseous form. Whether they be formed or compounded as a mixture or as a chemical union is not important. The commercial product known as "Plastic Wood" is an example of a patented composition, also compounds such as acid inhibitors, rust removers, coppering solutions, foam producers, etc.

5. Plants

THE patent laws were amended in 1930 to permit anyone who has invented or discovered and asexually reproduced any distinct and new variety of plant, other than a tuber-propagated plant, to obtain a patent therefor.

✦ ✦ ✦

THE Statute does not give the inventor protection upon the **product** of the plant, that is, the fruit, nut, or flower. Propagation is limited to asexual reproduction, such as by grafting, budding, cutting, layering, division, inarching, but not by seeds.

✦ ✦ ✦

6. Designs

AN original and **ornamental** design is patentable. This class takes into consideration such products as have aesthetic appeal. For instance, a new design of wire cloth, some ornamental object constructed of wire, an ornamental upholstery nail, etc.

✦ ✦ ✦

The Formal Parts of a Patent Application

A COMPLETE application for patent consists of the following:

1. **A petition.**
2. **A specification (description).**
3. **The claims.**
4. **The inventor's oath.**
5. **The drawings (if necessary).**
6. **The Government filing fee.**
7. **Models (when required).**

✦ ✦ ✦

BECAUSE patent law is purely statutory and the preparation of a patent application is highly technical, it is always advisable to employ a competent patent attorney to prepare the application.

✦ ✦ ✦

OF the above parts of an application, the **claims** are the most important. The drawings of course show the invention, where the invention is capable of illustration, and

the specification must be a full, clear, and concise description of the invention in exact terms, and must refer to the parts illustrated in the drawings. Models are seldom required, except in extremely complicated cases, and with inventions claiming perpetual motion.

✦ ✦ ✦

THE patent statutes require that a formal and distinct claim or claims must be made by the inventor of that which he regards as his invention.

✦ ✦ ✦

THE phraseology of a patent claim is seldom understood by anyone not skilled in the technique and legal science of drafting and interpreting patent claims. In contemplation of law each claim in a patent, is in itself a separate patent. It is not unusual for a patent to be granted with ten or twenty claims in it, each one defining some different feature or combination of the invention.

✦ ✦ ✦

Steps Preparatory to the Filing of the Application for Patent

AN inventor is mainly concerned with the manner in which he can initially protect his invention. Much misleading information has been given inventors in this respect. The law favors the diligent inventor and for that reason the inventor and his attorney should cooperate to get a proper and formal application on file in the United States Patent Office as soon as possible after conception of the invention. Many valuable inventions have been lost by inventors who after having developed their inventions or prepared documents setting forth the details for the filing of an application have put the matter of filing the application aside for a more convenient time. The inventor who is first to file an application upon an invention has a great advantage in the United States Patent Office, for the burden is always on the one who files later to prove (in a contest with some rival inventor who was first to file an application for patent upon the invention) that he, in fact, first conceived the invention and was **diligent** in reducing the invention to practice.

✦ ✦ ✦

IF the invention has some physical form, such as in the case of a machine, and the inventor has a model of the invention, it is always well to disclose this model to the attorney, supplemented by a detailed explanation of the working parts and functioning of the machine.

✦ ✦ ✦

IN the absence of a model the inventor should prepare drawings, diagrams, etc., supplemented by a detailed description of the operating parts of the invention, using reference characters applied to the parts of the drawing in explanation of the operation. Patent attorneys are skilled in preparing formal drawings and descriptive matter from sketches and non-working drawings submitted by the inventor so it is not ordinarily necessary for the inventor to prepare detailed working drawings of the invention.

✦ ✦ ✦

VERY often patent attorneys have forms which they will send gratis to the inventor, upon which the inventor can record the invention.

✦ ✦ ✦

IT is always well in the initial drawing, sketch and descriptive matter of the invention, for an inventor to have some corroborating witnesses sign the documents and date the same. The witnesses must, of course, fully understand the parts and operation of the invention.

✦ ✦ ✦

IN inventions relating to compounds, compositions of matter and processes involving physical changes it is well to set forth the ingredients, the proportions by weight or volume thereof; exact steps of treating the materials (in succession) designation of heat and pressure treatments, and periods of treatment. If any chemical reactions occur during the compounding or treatment of the materials, such should be fully set forth, and if the resultant composition is composed of different ingredients than those used in producing the composition, such should be carefully outlined, for it is possible, in an invention of this kind, to claim not only the process of producing the invention, but also the ingredients making up the product.

✦ ✦ ✦

IN composition of matter cases it is always well for the inventor to give a critical range of values, such as a high and low range of heat treatment, and if there is a critical range of pressures such range should be fully stated. Also a critical range of proportions of each ingredient should be given. Knowledge of critical values always enables the attorney to properly prepare claims and secure better protection for the inventor.

✦ ✦ ✦

Search of the Patent Office Records and Attorney's Report on Patentability

THE inventor's attorney after having received the inventor's disclosure of his invention conducts a preliminary examination of the records in the United States Patent Office, **to discover to what extent other inventors have patented or developed similar inventions.**

✦ ✦ ✦

THE usual charge for such an examination ranges between $10.00 and $25.00, except in the case of complicated inventions. The prior patents or other data which the attorney finds as the result of the search are then analyzed, and a written report is prepared and sent to the inventor. Copies of any pertinent United States patents which are found as a result of the search are also sent with this report, without charge. In the report the inventor is advised whether or not, in the attorney's opinion, the invention is patentable over the inventions shown in the patents found as a result of the search. In the report the inventor is usually advised of the detailed cost of preparing and filing an application for patent if the invention is found to be patentable.

✦ ✦ ✦

THE complete application papers after they are prepared by the attorney are sent to the inventor for signing and approval prior to filing in the Patent Office.

✦ ✦ ✦

Patent Office Examination of the Application for Patent

UNDER the present American system of examining patent applications, technically and legally skilled officials of the United States Patent Office examine the applica-

(Please turn to page 517)

GOVERNMENT WIRE PRODUCTION INFORMATION

Government Information War Production Board

THE War Production Board recently separated the controls imposed on tungsten and molybdenum through order M-369, by the issuance of a new order, M-369a, which applies to tungsten only. This change was necessary, WPB said, because of increased war demands for tungsten, which have necessitated restrictions on the metal, but which did not apply to molybdenum.

✦ ✦ ✦

THE new tungsten order, M-369a, effective today, does not materially alter the basic restrictions on the metal now in effect, but it does add the following controls:

(a) Tungsten compounds from which tungsten powder is made are placed under the restrictions of the order.

(b) Intracompany deliveries are further restricted. The restrictions apply to tungsten products and tungsten compound. Rod and tungsten compounds may be delivered without authorization only for certain purposes.

(c) An exemption is provided for small transactions of 100 pounds or less in any calendar month, but this applies only to contained tungsten in the form of tungsten compounds or powder.

✦ ✦ ✦

RESTRICTIONS applicable to molybdenum products and alloy products remain unchanged under order M-369. However, Amendment No. 1 to M-369, removes references to tungsten and to the forms that relate to tungsten.

✦ ✦ ✦

Copper Coming from Britain Under Reverse Lend-Lease

LEO T. Crowley, Foreign Economic Administrator, issued the following statement recently:

✦ ✦ ✦

THE British Government, during the first quarter of the current year, made available to the United States under reverse lend-lease, and thus without cash expenditure by us, 30,000 tons of Rhodesian copper, and has agreed to supply to us an additional 42,000 tons under reverse lend-lease during the second quarter. This latter consignment is part of a total of 175,000 tons that we have requested of the British during the remainder of the year. Expansion of some features of the munitions production program within the United States, which has increased our need for copper, caused the assignment at this time and the request for the proposed additional assignment.

✦ ✦ ✦

THIS represents a further extension of the British reverse lend-lease commodity program to this country, inasmuch as this is the first Rhodesian copper that the British have made available to the United States under reverse lend-lease. They have, however, previously made copper from Cyprus available to us under reverse lend-lease.

✦ ✦ ✦

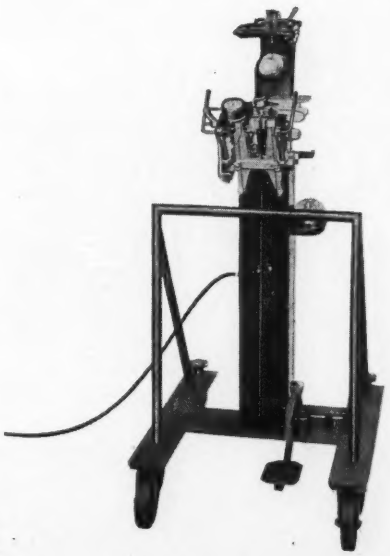
(Please turn to page 500)

MICROMETER PRECISION MICRO-WELD TRADE MARK REG. U. S. PAT. OFF.

CONTINUOUS IMPROVEMENT

MICRO-WELDERS with dial indicating annealing attachments are now available for high carbon wire.

There is positive control of annealing temperature and already hundreds of these special MICRO-WELDERS are proving their dependability and satisfactory performance with leading manufacturers.



MICRO PRODUCTS COMPANY

20 NORTH WACKER DRIVE, CHICAGO 6, ILL.

Telephone, State 7468

More Ammunition . . . in a Hurry!

Ammunition Boxes *with* *Elco Screws *made of* KEYSTONE Wire

Elco screws and bolts . . . though insignificant in relation to the size of the completed product on which they're used . . . play a major role in production and assembly. Literally millions of them, of every conceivable shape and size, find their way into countless items for both war and peace.

The versatility of Elco screws and bolts is matched by the Keystone wire from which they are made. Whether the needs call for special analysis or what-have-you, Keystone delivers quality wire that "fills the bill."

Soon, we hope, Keystone wire will be available for civilian production in greatly increasing amounts.

*Elco Tool & Screw Corporation, Rockford, Ill.

KEYSTONE STEEL & WIRE CO.
PEORIA 7, ILLINOIS

Special Analysis Wire for All Industrial Uses

SAMSON SPRING WIRE — REG. U.S. PAT. OFF. — KEYSTONE STEEL & WIRE CO. PEORIA, ILL.

Coppered, Tinned, Annealed, Galvanized

Government Wire Production Information

(Continued from page 499)

WPB Announces Changes in Plasticizer Allocations

PRODUCERS requesting allocations of phosphate and phthalate plasticizers for insulation of wire and wire cable are now required to specify the type of wire for which the material is required.

✦ ✦ ✦

THIS is in line with amendments to Schedule 61 (Phosphate Plasticizers) and Schedule 63 (Phthalate Plasticizers) of Order M-300, the general chemicals allocation order.

✦ ✦ ✦

AT the same time, dicarbitol phthalate was placed under the control of Schedule 63 of M-300. The initial allocation date for the newly allocated phthalate plasticizer is June 1.

✦ ✦ ✦

WPB explained the plasticizers are in tight supply due to a shortage of phthalic anhydride, an essential raw material.

✦ ✦ ✦

REQUESTS for the plasticizers for wire and cable insulation must be made in accordance with the following list.

A.I.E.E. — 45
Aircraft — ANJC — 48 a
Assault wire — W — 130 ( )
British shipboard
C. A. A. Border lights
Coaxial
Combat wire WD—1/TT
Field wire—WD—12/TT
F.X.Z.—599
Navy shipboard cable — 15 C 1
Ordnance tank wire — 90-12
P. O. S. N.
P.S.N.
Railway signal wire
Radio — JAN-76
Shot fire
S. J. S. N.
S. N.
S. N. W.
Telephone and telegraph wire
Tubing
71 — 700 cord
Others (Identify)

✦ ✦ ✦

FILING dates for customers' and suppliers' forms have been delayed. Customers' applications (Form WPB-2945) must be submitted by the 17th of the month instead of the 15th, while suppliers' forms (WPB-2946) are due on the 22nd of the month instead of the 20th.

WPB reports that members of the Bedding Industry Advisory Committee, at a recent meeting, said that bedding manufacturers are experiencing serious difficulty in obtaining delivery of steel against their allotments and requested that the War Production Board advise a method of channeling steel that is not needed for military purposes to the industry.

✦ ✦ ✦

WPB officials assured committee members of prompt action:

(1) **To determine the reason for the reported non-delivery of steel, and**
(2) **To help bedding manufacturers obtain an equitable share of the steel wire not required for military purposes.**

✦ ✦ ✦

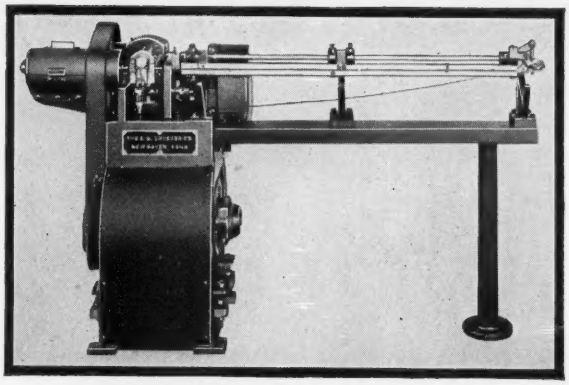
WPB representatives emphasized, however, that requirements for high carbon, heat-treated steel wire to fulfill four urgent military programs — for communications wire, tire bead wire, wire rope, and box strapping wire—are extremely high, and are expected to increase further. Wire needed for these purposes, they explained, is made with the same facilities as are used to make wire for bedding. Though wire production capacity has been expanded, wire producers have been unable to keep up with increasing military demands because they have been seriously hampered by transportation difficulties, bad weather conditions, and shortages of fuel and manpower, WPB representatives pointed out. To insure that military requirements can be met, officials explained, WPB has directed mills to use certain facilities exclusively for military orders. The facilities available to fill civilian orders therefore are limited.

✦ ✦ ✦

Catalog Describes Line of Copper and Copper Alloys

THE American Brass Company, Waterbury, Conn., has issued a 40 page catalog covering its line of Anaconda Copper and copper alloys in sheet, wire, rods, tubes and other forms. Complete data giving the product, approximate composition and suggested uses are included.

(Please turn to page 502)



SHUSTER WIRE STRAIGHTENER TYPE A
Wire Capacity 1/32" - 1/16" Diameter

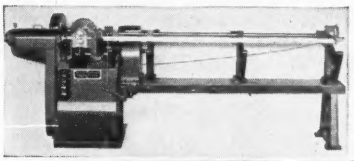
Faster Cutting Speeds
GREATER PRODUCTION!

✦

Outstanding Features—

Almost continuous wire travel
Lightning cut-off assures square-cut ends
High speed, direct driven 5-die straightening flee
Quiet, highly efficient V-belt motor drive
Ball and roller bearings throughout
Extremely rigid construction
Fully guaranteed as to material and workmanship

New descriptive folder on request



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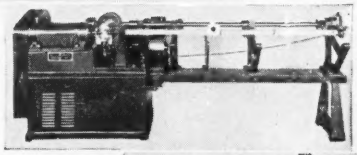
Dia.



Type 2A
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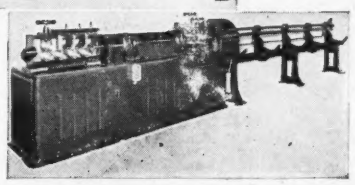
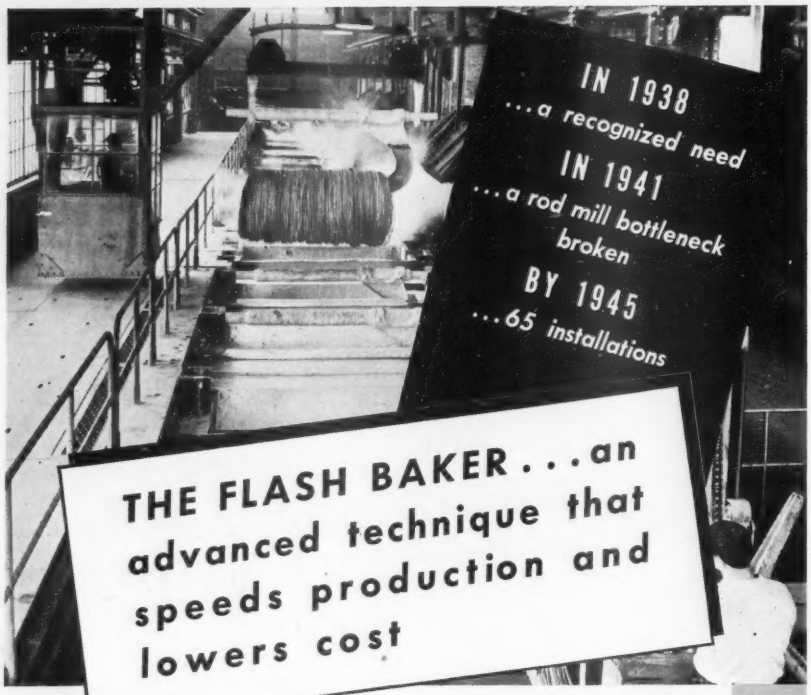


Type 3A
3/16" - 3/8" Dia.

Type 4A (not shown)
3/8" - 5/8" Dia.

The F. B. Shuster Mfg. Co., Inc., New Haven, Conn.

SHUSTER
Automatic
WIRE STRAIGHTENING
AND CUTTING
MACHINES
Since 1866



An idea conceived in 1938 by Morrison engineers is saving hundreds of thousands of man-hours in wire and rod mills.

The idea is the forerunner of the Morrison Flash Baker now installed in 28 plants using over 65 separate units.

THE EQUIPMENT DOES IN MINUTES WHAT FORMERLY TOOK HOURS

An excellent lime coat is achieved together with a high recovery from acid embrittlement.

The Flash Baker fits into straight or circular layout, occupies the space of one tank. The rod never leaves the hairpin hook as it is transferred from pickling, washing, sulling and liming tanks preliminary to baking.

Data sheets detailing actual operations are available to wire mill engineers.

OVENS MORRISON ENGINEERED FURNACES

MORRISON ENGINEERING CORPORATION
5005 EUCLID AVENUE • CLEVELAND 3, OHIO
Associate Companies:
MORRISON ENGINEERING OF CANADA, LTD. Toronto, Ontario
CARRIER ENGINEERING CO., LTD. London, England

Government Wire Production Information

(Continued from page 501)

Huge Signal Corps Salvage Depot in Paris Reclaims Wire

A PARIS department store warehouse has been converted into the U. S. Army's principal Signal Corps salvage and reclamation depot in the European Theater; and the depot is unique in that it is the only spare parts market for signal equipment on the entire Continent.

✦ ✦ ✦

THE depot is staffed by five hundred Signal Corps officers and men and employs an average of a thousand French civilians to handle the varied demands of so big an assignment.

✦ ✦ ✦

ONE chief phase of the work is a clean-up job reclaiming nearly 100,000 miles of wire that was left strung across the battlefields of France, Belgium, Holland and more recently Germany in a vast tangle running through orchards, gardens, ditches, and over mountains and rivers to carry the urgent messages and orders of war and supply.

✦ ✦ ✦

THE reclaiming task involves testing, splicing and re-winding the wires and cables, and this is done by the French civilian employees, working under the supervision of soldier technicians. These civilians also handle the heavy salvage and repair work of equipment in the Theater.

✦ ✦ ✦

OTHER sections of the depot rebuild radios for tanks, grind crystals for secret communication channels, repair damaged radar units, telephones, teletypes and telegraph instruments, and power generators.

✦ ✦ ✦

Unrated Orders for Brass Mill Products May Be Placed Now for Immediate Delivery

AN item of considerable interest and importance to copper and brass mill fabricators was the announcement to the effect that the Controlled Materials Plan has been "open ended" for delivery of brass mill products on unrated orders five weeks in advance of the July 1st date for the general release of Controlled

Materials on unrated order. Accordingly, W.P.B. has issued amendments to C.M.P. Regulation 1 and C.M.P. Regulation 4.

✦ ✦ ✦

ARMED service requirements for communications wire have been cut back from 313,500 miles monthly to 218,000 miles, members of the Copper wire and Cable Industry Advisory Committee were informed by W.P.B. officials.

✦ ✦ ✦

FIELD wire requirements represented the largest reduction, dropping from 211,000 miles monthly to 156,000 miles; assault wire from 83,000 miles to 52,000 and long range wire from 19,500 to 10,000.

✦ ✦ ✦

Invisible Dye Aids Tropicalization

WITH the Japanese War being fought on an ever greater scale, U. S. Army Signal Corps Laboratories have been spurred to new research in scientific tropicalization, and a recent development is the use of an invisible dye to facilitate inspection of treated equipment.

✦ ✦ ✦

THIS invisible or fluorescent dye is mixed with the lacquer which is sprayed over radios, field telephones and other communication equipment to prevent the inroads of fungus and moisture, its chemical composition varying according to the particular lacquer used.

✦ ✦ ✦

ALL the lacquers, whatever their content, are colorless, or nearly so, in order that the numbers and the identification marks on the various instruments may be plainly read through them. The result is that it is not easy, by ordinary vision, to check on the thoroughness and evenness of the spraying.

✦ ✦ ✦

TO aid in this, a special lamp, strong in its emission of ultra-violet rays and equipped also with a deep purple filter, comes to the aid of those responsible for inspection. This lamp, directed upon the equipment, picks up the ultra-violet dye in the lacquer (though it is quite invisible to the eye) and shows with perfect clarity any imperfections in the spraying.

A SIMPLE field expedient which can be used in war theaters to discover weak spots in the spraying is to try writing upon lacquered equipment with an ordinary pencil. Wherever the pencil glides as if on glass the spraying has been adequately done. If it "starts to write" it has found a weak spot. Often the tropicalization of communication equipment can then be completed in the field. But the need for such improvization in battle areas arises less frequently now that new methods aid in inspection of equipment tropicalized at home.

Wire Association Convention Plans

AT the Convention in October it is planned tentatively, for the greater convenience of members, to group similar subjects together in the same sessions. In furtherance of this plan, one session will be set aside for the informal discussion of various new products and practices, some of which will have been introduced in the usual way by written papers, and some not. The program committee would like suggestions from members as to matters they would like to hear talked over. Please send them to the chairman, Kenneth B. Lewis, 43 Midland St., Worcester, Mass.

Angier
OF FRAMINGHAM
50Th. ANNIVERSARY
1895 – 1945

Resilient, spiral wrapping papers that S-T-R-E-T-C-H — originated by Angier of Framingham many years ago — were quickly recognized as the long-awaited solution to the problem of "How to provide tight-fitting, non-breaking, protective wraps for coils of wire, etc."

To supply a complete and trouble-free service to the users of these wraps, Angier Engineers developed practical wrapping machines built for long life — equipped with tension, edge-folding and coreless devices which cut down interruptions, eliminate cores and the wasting of paper, producing lower unit wrapping costs.

Angier Machines and Wrappers are illustrated in a new booklet, "The Better Way to Wrap Coils" — yours for the asking.

When writing us, please mention by name this magazine.

Angier
ANGIER CORPORATION
CORROSION PREVENTIVE AND WATERPROOF PAPERS
FRAMINGHAM, MASSACHUSETTS

A Review of Recent Wire Patents

No. 2,374,850, INNER SPRING UNIT, patented May 1, 1945 by William E. Wunderlich, Muncie, Ind.

✦ ✦ ✦

Special means is provided for attachment of the wire coils to the frame, the ends of the coils being specially bent to effect the connections.

✦ ✦ ✦

No. 2,375,154, ELECTRIC FURNACE, patented May 1, 1945 by Renzo U. Volterra, Attleboro, Mass., assignor to Metals & Controls Corporation, Attleboro, Mass., a corporation of Massachusetts.

✦ ✦ ✦

A resistance wire for electric furnaces is provided, comprising a molybdenum core and a platinum sheath thereon.

Complete Descriptions and Drawings of Patents May Be Had for 25 cents; outside United States and Canada, $1.00. Address, Wire & Wire Products, 300 Main St., Stamford, Conn.

No. 2,375,434, APPARATUS FOR COPPER COATING FERROUS METAL STRIP, patented May 8, 1945 by Bolton C. Moise, Rock Point, Md., and Bolton C. Moise, Jr., Cambridge, Mass.

✦ ✦ ✦

The construction and arrangement of the apparatus is such that a cooling chamber between the furnace chamber and a roll stand (on the entrance side of the chamber and through which the strip passes) prevents furnace temperature from reaching the roll stand.

✦ ✦ ✦

No. 2,375,446, RESISTANCE OR FUSE WIRE, patented May 8, 1945, by Cecil Spencer Sivil, Roselle, N. J., assignor to Baker & Company, Inc., Newark, N. J., a corporation of New Jersey.

✦ ✦ ✦

This wire comprises an alloy of about 40% platinum, 57% palladium and 3% ruthenium.

✦ ✦ ✦

No. 2,376,476, AUTOMATIC SCREW MACHINE, patented May 22, 1945 by Paul E. Chatelain, Detroit, Mich., assignor to The Wickman Corporation, Highland Park, Mich., a corporation of Ohio.

✦ ✦ ✦

The machine is of the Swiss type and includes two collets (feeding and holding) which are actuated by cam means in timed relation to the feeding and return movements of the head stock.

✦ ✦ ✦

No. 2,376,640, COMBINED OVEN TRAY AND COOKING RACK, patented May 22, 1945 by Harry D. Wall, Pasadena, and Preston B. Wall, Oakland, Calif., said Harry D. Wall assignor to Rack's Inc., Pasadena, Calif., a corporation of California.

✦ ✦ ✦

This rack is composed mainly of a number of lengths of heavy wire and includes a pair of pivoted cooking racks above the main portion of the tray.

✦ ✦ ✦

No. 2,376,924, WIRE-FEEDING MEANS FOR FASTENING INSERTING MACHINES, patented May 29, 1945 by Harold Lane and William Arthur Barton, Leicester, England, assignors to United Shoe Machinery Corporation, Flemington, N. J., a corporation of New Jersey.

✦ ✦ ✦

The wire, as it is fed, is received by a guide, which moves with it during the feeding operation, to guide the wire in a rectilinear path.

✦ ✦ ✦

No. 2,377,153, ELECTRIC CABLE, patented May 29, 1945 by Philip Vassar Hunter, London, Harold John Allcock, Belvedere, and Ronald McLeod Fairfield, Leigh, England, assignors to Callender's Cable & Construction Company Limited, London, England, a British Company.

✦ ✦ ✦

More specifically, the invention is in the cable covering and comprises a dielectric consisting at least mainly of normally solid polymers of ethylene, a smooth tube disposed between the conductor and the dielectric and lying in close contact with the dielectric, this tube consisting at least mainly of a non-metallic plastic material and a conducting powder and surrounding the conductor with a clearance sufficient to ensure that, under all working conditions of the cable, the external dimensions of the conductor are less than the corresponding internal dimensions of the tube, the space within the tube being substantially at atmospheric pressure.

NOW IS THE TIME TO PLAN FOR POST-WAR DISTRIBUTION OF YOUR PRODUCTS TO THE ELECTRICAL DISTRIBUTORS AND ELECTRICAL HARDWARE JOBBERS

If you are new to this market, we have the experience of 25 years as a National Sales Organization, with 18 warehouses and some 50 salesmen, located throughout the U. S., selling exclusively to wholesalers. Will consider a National Distributorship under our own trade name or yours. FINANCIAL references exchanged.

HATHEWAY & COMPANY

75 Montgomery St., Jersey City, 2, N. J.

Patent Office Establishes New Service

COMMENCING June 1, 1945, the United States Patent Office puts in operation a new service to industry and inventors. The purpose of the service is to bring to the attention of the nation patented inventions under which the owners are willing to grant licenses on reasonable terms; it is hoped that such information will lead to greater employment opportunities in the reconversion period, as well as permit industry to become acquainted with what is being done in various fields.

✦ ✦ ✦

TO accomplish the purposes set out above, a Register of Patents available for licensing is now being established, and will be maintained in the United States Patent Office. Patents recorded on this register will be published in the Official Gazette of the Patent Office; and we shall hope to publish from time to time selected lists applicable to the wire industry.

✦ ✦ ✦

Beeson Returns to Pitsburgh Steel

JOSEPH H. CARTER, President of the Pittsburgh Steel Company has announced the election as executive vice president of Lt. Col. John Kennedy Beeson, who recently completed his duties with the United States Strategic Air Forces in Europe.

✦ ✦ ✦

COL. BEESON is the son of the late Charles E. Beeson, one of the original founders of the Pittsburgh Steel Company.

A GRADUATE of Yale University Col. Beeson was vice president in charge of sales for Pittsburgh Steel when he enlisted in the Air Corps in May, 1942. Previously, he was assistant general superintendent of the company's plant operations at Monessen and Allenport, Pa.

✦ ✦ ✦

COL. BEESON served as President of the Wire Association for two terms, 1939 1940 and 1940-1941. We extend to him our congratulations on his selection as Executive Vice President and a hearty welcome back.

✦ ✦ ✦

Imhoff Moves to California

THE Wallace G. Imhoff Company, for many years located at Vineland, N. J., moved their place of business to 905 South Bedford Street, Los Angeles, California. Mr. Imhoff is well known as a consultant on zinc, lead, and tin coatings, and his many friends will wish him continued success in his new offices in sunny California.

"Don't take Our word for it...
PROVE IT YOURSELF!"

- More Tonnage Per Die
- Less Die Changing
- Smooth, On-Size Finish
- Lower Die Cost

WIRE and BAR DIES • SIZING DIES
EXTRUDING DIES • TUBING DIES
Carbide Blanks, Tools, Bits,
Reamers, Broaches, Forming Tools

TECO Cemented Carbide Dies have earned their place the slow but conservative way . . . on the basis of proof, not promise. This is the most practical way for you to select carbide dies.

MAKE THIS CHANGE! Equip a machine or two with TECO Cemented Carbide in place of your present carbide dies. Run exactly as before, then let results speak for themselves.

You'll find the harder, denser, more uniform TECO Cemented Carbide has greater resistance to wear and pitting. One of our engineers will gladly discuss your needs or arrange a test run, at your convenience. Write today.

ARMY E NAVY

TUNGSTEN ELECTRIC CORPORATION — 564 39th St., Union City, N. J.
Branch Office: 2906 Euclid Avenue, Cleveland, Ohio
Representative: Architects & Builders Bldg., Indianapolis, Ind.

TECO
Pioneers in Tungsten Carbides for over a Quarter Century
CARBIDE DIES

Outstanding Personalities of the Wire Industry

B. F. Ilsley with G.E.

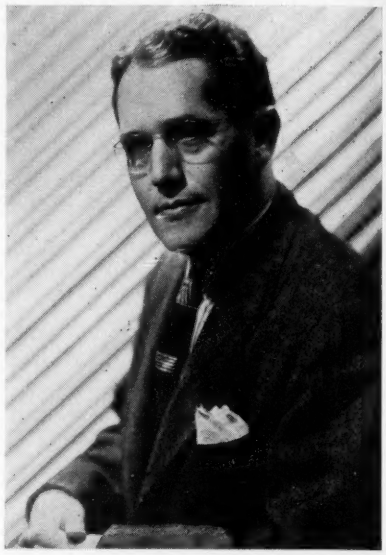
B. F. Ilsley has been appointed Manager of **General Electric's** Wire and Cable Division.

✦ ✦ ✦

FOLLOWING his appointment, Mr. Ilsley announced that the Wire and Cable organization would be divided into two sections, the Cable section here in Schenectady and the Magnet Wire section in Fort Wayne.

JAMES H. Gregg was recently appointed Assistant to the Vice President of **Reynolds Wire Co.**, Dixon, Illinois. He was formerly connected with the Gregg Mfg. Co. of Saint Paul, Minn., and later was President of the Gregg Manufacturing Co., Ltd. of Winnipeg, Canada, an American-owned concern, which has been sold to a cooperative association in Winnipeg. Mr. Gregg has a wide acquaintance among hardware manufacturers and jobbers both here and in Canada.

SAM K. Beetham, Advertising and Public Relations Counselor, has joined the firm of **McClure & Wilder, Inc.,** of Warren, Ohio, as Vice President in charge of Public Relations and New Business Departments.



SAM K. BEETHAM
Advertising and Public Relations Counselor, McClure & Wilder

MR. Beetham recently left the **Owens-Illinois Glass Company** of Toledo where he had been advertising manager of the Libbey Glass Division and the **Owens-Illinois Can Company** prior to its acquisition by Continental Can Company. During most of the years spent with Owens-Illinois he handled all the conventions and trade show activities of that Company and its subsidiaries.

✦ ✦ ✦

Republic Steel Appointment

CHARLES M. White, formerly vice-president in charge of operations of the **Republic Steel Corporation,** has been elected to the office of president, **T. M. Girdler,** chairman, announced recently. His assistant, **E. M. Richards,** has been named to succeed him. The changes were occasioned by the resignation of R. J. Wysor from the presidency of the Corporation to engage in a new activity.

"HUBBARD CAN SOLVE THIS PROBLEM FOR YOU"
A continuing program of testing and field research explains Hubbard's ability to furnish exactly the right kind of spool or reel for any wire mill need. Hubbard products also embody patented features that help reduce your operating costs.
Get complete details on Hubbard spools and reels to suit your particular requirements. Write today mentioning any specific difficulty on which you would like some help.
ARMY... NAVY
HUBBARD SPOOL COMPANY
1624 CARROLL AVENUE | CHICAGO 12, ILLINOIS
Since 1912, manufacturers of wire drawing and annealing, and shipping spools and reels.
PLANTS AT CHICAGO, ILLINOIS AND GARRETT, INDIANA

Wickwire Spencer Names Franz Buffalo Plant General Superintendent

MR. R. T. Dunlap, Vice President in Charge of Operations, **Wickwire Spencer Steel Company,** has announced the appointment of **Mr. Alvin F. Franz** as General Superintendent of the Buffalo Plant of the company.

✦ ✦ ✦

MR. Franz, well known in the steel industry, was previously General Superintendent of the Allan Wood Steel Company of Philadelphia, Pennsylvania, a position he held for 15 years, and before that was Open Hearth Superintendent of the Otis Steel Company of Cleveland, O.

✦ ✦ ✦

IN his new position, Mr. Franz will be in charge of all production at Buffalo, including Wickwire Spencer's Open Hearth, Hot Mill and Wire Departments.

✦ ✦ ✦

New Rod Plant in Operation

INTERNATIONAL Nickel Company, Inc., is now operating its new high speed welding rod oven installed at the Bayonne, New Jersey plant by the **J. O. Ross Engineering Corporation.**

✦ ✦ ✦

ALBERT L. Bergstrom has been elected vice-president of all engineering, The Timken Roller Bearing Co., Canton, Ohio. Mr. Bergstrom joined the organization in 1929 as development engineer, later becoming chief works engineer and executive engineer.

✦ ✦ ✦

B. S. Pease, assistant manager of the Wire Rope and Construction Materials Division, American Steel & Wire Co., Cleveland, has retired. He is succeeded by **Myron E. Capouch** who has been assistant manager of the company's electrical and wire rope department at Chicago.

✦ ✦ ✦

MOWRY E. Goetz has been appointed assistant to the vice president in charge of operations, Republic Steel Corp., Cleveland. For the past five years, Mr. Goetz has been manager of Republic's Chicago district. He has been associated with Northwestern Steel & Wire Co., Sterling, Ill., as general superintendent, and earlier with Jones & Laughlin Steel Corp., as superintendent of the open hearth and rolling mill departments at the Aliquippa works. He joined Republic in March, 1940.

✦ ✦ ✦

JOHN B. Harlow, contract license manager of the **Electrical Research Products** division of Western Electric Company, passed away at his home on May 15th. Mr. Harlow was 61 and had more than 35 years of service in the Bell System.

✦ ✦ ✦

GUILFORD Duncan, President of the **Ludlow-Sayer Wire Company,** St. Louis, Mo., died on May 9, 1945 at the age of 67, following an operation. He became the head of the company in 1911, when he succeeded his father, the late William Duncan. The company is well-known as large manufacturers of wire cloth.

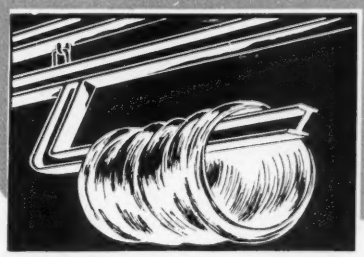
(Please turn to page 508)

✦ ✦ ✦

MR. E. W. Engle, Research and Consulting Metallurgist for **Carboloy Company, Inc.,** died at his home in Detroit on April 26th at the age of 57. He was recognized as one of the outstanding authorities, not only in this country but in the world, on the subject of tungsten and tungsten carbides.

New! **Oakite CrysCoat Process Lengthens Die Life**

Gives You MORE TONS LONGER RUNS



This new development, already successfully used in a number of mills, produces a phosphate coating on ferrous rods and wire that results in many advantages and economies in drawing. Employing a new material known as Oakite CrysCoat No. 86, the process is simple in application . . . and inexpensive.

Process Prolongs Die Life!

Rods or wire immersed in the recommended solution of Oakite CrysCoat No. 86 acquire a non-hygroscopic, ductile, crystalline coating of fine grained structure. This coating combines CHEMICALLY with the surfaces treated. It serves to interpose between the metal and the die a tenacious parting layer which acts as an added lubricant for the die. In addition, the crystalline coating has the property of adsorbing the usual die lubricants and of retaining them. Because of this, die life is considerably lengthened.

Technical Data In FREE Service Report!

Advantages known to result from the application of the Oakite CrysCoat Process are increased production, uniformly excellent appearance of wire, shorter down-time of equipment because necessity for replacing or changing dies is far less frequent. Mill superintendents interested in this NEW Oakite coating technique are invited to send for further details. Or production tests will be arranged for at your convenience.

OAKITE PRODUCTS, INC., 52A Thames St., NEW YORK 6, N. Y.

Technical Service Representatives Located in All Principal Cities of the United States and Canada

OAKITE MATERIALS...METHODS...SERVICE — *Buy Bonds for Victory* — **CLEANING** FOR EVERY CLEANING REQUIREMENT

Outstanding Personalities of the Wire Industry

(Continued from page 507)

Firth-Sterling Elects New Directors

ELECTION of four new directors of the **First-Sterling Steel Company,** and the retirement at their own request of three long-time members of the board, were announced in May by L. Gerald Firth, president of the company.

✦ ✦ ✦

THE new directors are **Irving W. Wilson,** of Pittsburgh; **Arthur H. Bunker** and **Harold J. Szold,** both of New York; and **A. C. Wickman,** of Toronto, Canada, and Coventry, England. Those retiring are Lewis J. Firth, Thomas D. McCloskey and Donald G. Clark, all of Pittsburgh. Mr. Firth, founder of the company, retires at the age of 87 after more than 70 years of activity in the tool steel industry. Mr. McCloskey, of the law firm of McCloskey, Best and Leslie, has been long associated with Firth-Sterling and will continue as its legal counsel. Mr. Clark, who has been with the company for 42 years, will remain in an executive and consulting capacity.

MR. L. GERALD FIRTH
President
Firth-Sterling Steel Company

OF the newly elected directors, Mr. Wilson is vice president in charge of operations and a director of Aluminum Company of America, with which he has spent his entire business career, since graduation in 1911 from Massachusetts Institute of Technology.

✦ ✦ ✦

MR. Bunker retired recently as vice chairman of the War Production Board, after four years' service in Washington. He formerly was director of the aluminum and magnesium division of the board, and was responsible for the entire program of government expansion of plants for those industries. Prior to 1941, he was executive vice president of Lehman Corporation, and a director of numerous other corporations.

✦ ✦ ✦

MR. Szold has had many years of experience in merchandising and financial fields. He is a partner in Lehman Brothers, New York, and a director of Allied Stores Corporation, Gimbel Brothers, Inc., and other nationally known concerns.

✦ ✦ ✦

AS head of the firm of A. C. Wickman, Ltd., of Coventry, Eng-

"*Steelskin Brands*"

Reg. U. S. Patent Office

WIRE, TUBING, STAMPING
DEEP DRAWING SOAPS AND COMPOUNDS

Exceptional results are being reported by Mills using "STEELSKIN" C.H., WIRE DRAWING POWDER.

For STAINLESS:—Six continuous holes .255 to .125 on oxide coated and limed wire, one hole .255 to .182 on limed wire only, and many other difficult applications.

For High Carbon:—speeds on continuous machines up to 2000 feet per minute.

Back of the "STEELSKIN" TRADEMARK is a thirty-five-year period of experience in the development and manufacture of soaps and compounds for dry and wet drawing of all types of ferrous and non-ferrous wire.

OUR ENGINEERS WILL BE GLAD TO COOPERATE WITH YOU IN FINDING THE MOST ECONOMICAL AND EFFICIENT SOLUTION TO YOUR DRAWING PROBLEMS.

Write or phone. Tel. NO. HOMER 192.

R. H. MILLER COMPANY

HOMER, NEW YORK
Established 35 Years

land, Mr. Wickman is credited with leadership in the development of the carbide industry in England, Canada and other parts of the British Commonwealth. He is now a part-time resident of this country, and therefore will be in active contact with Firth-Sterling affairs.

✦ ✦ ✦

REELECTED to board membership were L. Gerald Firth, James W. Kinnear, Jr., and William Loach. Mr. Kinnear, whose father was one of the company's organizers and for years a Firth-Sterling officer and director, is assistant manager of operations, Pittsburgh district, Carnegie-Illinois Steel Corporation. Mr. Loach was president of the Wolf Tongue Mining Company, now a division of Firth-Sterling, and a pioneer in the mining and utilization of tungsten ores.

✦ ✦ ✦

PRESIDENT Firth stated that the company's active management and policies are to continue unaltered, and that the changes in the directorate are another step in the program of development and expansion announced some weeks ago. Each member of the board is in position because of his experience, Mr. Firth said, to make a highly specialized contribution to the company's operations.

✦ ✦ ✦

IN reporting to the stockholders, Mr. Firth said that the company continued to operate during the past year at as near maximum capacity as was possible with available manpower. He said also that plans are well under way for expansion of production, distribution and research facilities, and that he expected broadening use of carbides in the post-war period, in line with the sensational record of this material in accelerating war production. The company, he said, is one of the world's largest producers of sintered carbides, in addition to its ranking among the leading manufacturers of high speed steels.

✦ ✦ ✦

FIRTH-STERLING Steel Co. is now producing Mo-Max molybdenum-tungsten high speed steels. They will market Mo-Max steels under the trade names "Hi-Mo" and "Super Hi-Mo."

Balloffet Receives Second Star

THE many friends of **Balloffet Dies and Nozzle Co., Inc.**, Guttenberg, N. J., will be pleased to learn that this Company has been honored for the third time by the Under Secretary of War, in bestowing upon them again the Army-Navy Production Award for high achievement in the production of war material. This third award adds a second white star to the flag, and it is particularly gratifying to them as manufacturers of diamond dies for wire drawing to be given this distinction. The award was made on May 5th, 1945.

Receives "E" Award

ROXALIN Flexible Finishes, Inc., Elizabeth, N. J., were awarded the coveted Army-Navy "E" Production Award for high achievement in war production in April.

✦ ✦ ✦

THE award is one of the few made to paint manufacturers, the company being engaged in the manufacture of specialized industrial finishing materials, and being well known to the wire industry for their excellent lacquers and varnishes used in the manufacture of electric wire and cable.

WIRE MANUFACTURERS:

Are you interested in a post war yearly business of a half million dollars in rubber and synthetic wire and cables, to be manufactured for us under our own nationally known trade name, and sold by us strictly through wholesalers? References exchanged, and all communications confidential. Reply to Box No. 395 in care of this magazine.

NEW — AND BETTER

PATENTING
TEMPERING
ANNEALING

The Trauwood PROCESS

OUTSTANDING ADVANTAGES

Higher and more uniform physical and fatigue properties.

No surface decarburization or scale. Faster wire speeds . . . greater production.

Equipment fully automatic and easy to operate.

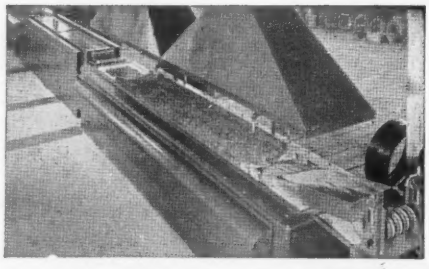
Control of heating and cooling cycles extremely accurate.

Thermal efficiency of the process very high.

Much finer grained structure possible.

High quenching temperatures rapidly attained.

Adaptable to high alloy and austenitic steel wire and strip (annealing of stainless).



Trauwood Electric Wire Tempering and Patenting Unit

The Trauwood Process, new in principle, eliminates high temperature furnaces and lead pots with their excessive maintenance costs and low thermal efficiencies. More positive temperature control is possible and quenching is done in a RISING temperature—instead of falling, as in conventional heat treating methods. The rapid rate of heating (4 to 5 times as fast as furnace heating) increases production and uniformly produces a finer grained product with higher physical and fatigue values.

Wire and rod patented by the Trauwood Process insures easier drafting and makes heavier reductions possible. In conjunction with the Trauwood patenting equipment, pickling, coating and baking can be made continuous, eliminating expensive handling and delay, materially reducing costs as compared with ordinary methods.

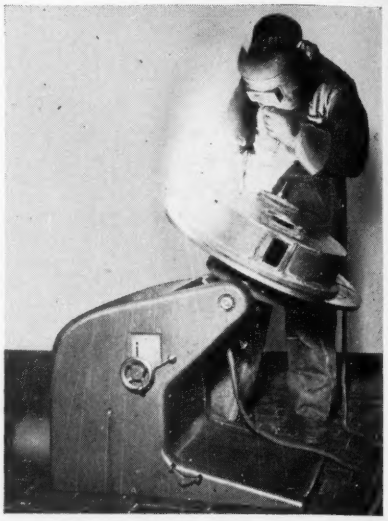
Complete details of the Trauwood Process will be furnished you on request. Our engineers will help you solve your continuous wire and strip patenting, tempering, and annealing problems. Write today.

THE TRAUWOOD ENGINEERING COMPANY

1740 E. 23rd STREET, CLEVELAND, OHIO, U.S.A.

Multi-Purpose Welding Positioner Introduced

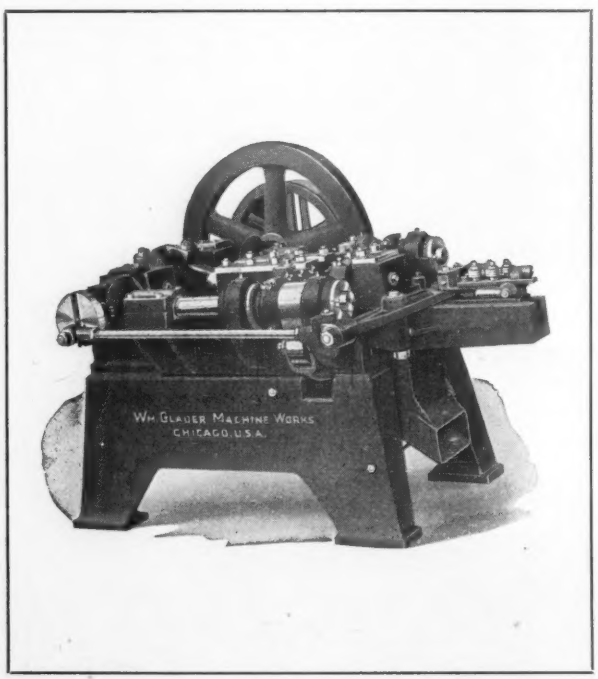
THE latest design in powered Welding Positioners is introduced by the **Standard Machinery Company** of Providence, Rhode Island, for rotating work up to 700 lbs. at speeds



Multi Purpose Welding Positioner ✦ ✦

from 0 to 2.4 RPM in either direction by easy hand wheel control. The unit will accommodate table speeds up to

GLADER HIGH SPEED WIRE NAIL MACHINE



High tonnage output, and low maintenance costs, have resulted in Glader Machines being accepted as standard equipment in every large nail mill built in the United States in the past twenty years.

Glader Machines are operating in most of the wire producing mills throughout the world.

These machines are made in eleven different types and sizes. This enables us to cover the range of sizes of nails produced with the greatest efficiency.

For further information please address,

WM. GLADER MACHINE WORKS

210 NO. RACINE AVE.
CHICAGO, ILLINOIS

180″ per minute with a work radius of 1′. Linear speeds at all radii are easily set and indicated on scale located on side of frame.

✦ ✦ ✦

TO obtain a desired welding speed it is only necessary for the operator to note the approximate radius at which the welding is to be done and to move the control wheel until the indicator is opposite the desired welding speed in the scale column for that radius. For sequence or step welding the table may be positively started, stopped or reversed.

✦ ✦ ✦

THE machine has proven adaptable for moving work past the torch and quench in flame hardening operations. The table can be removed easily and various jigs attached directly to the spindle. Also, the work mounted on positioner table may be tilted to any angle — permitting worker to operate at one position and so facilitate the inspection of parts or assembly operations.

✦ ✦ ✦

WHILE the table is originally designed for use as a support for parts to be welded and is only 28 inches in diameter it may be utilized also as a basis of power in moving fixtures and work across machine tool tables in sequence operations.

✦ ✦ ✦

THE Positioner is provided with a new built-in "Standard" Variable Speed Transmission and hydraulic cylinder for definite power control with a single ½ HP, 110, 220 or 550 volt electric motor. There are no belts or clutches. Instantaneous starting, stopping and reversing is provided by a foot operated switch controlling the driving motor.

✦ ✦ ✦

HEIGHT of the table is adjusted between 30″ and 36″ from the floor by means of its elevating screw. Hand operation of a latch permits rotation of the screw with respect to its supporting sleeve, in a manner similar to the raising or lowering of a piano stool.

✦ ✦ ✦

THE table is tilted by means of a hydraulic cylinder and gear segments. The oil pressure is developed

(Please turn to page 512)

NILSON

AUTOMATIC PRESS and FOUR SLIDE MACHINE

FOR SWAGING, STAMPING, PIERCING, BLANKING, FORMING OF COILED METAL

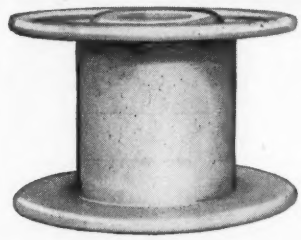
WE also build machines for forming Paper Clips, Buckles, Gate Hooks, Coat and Hat Hooks, Ceiling Hooks, Wire Ears, Cable Rings, Screw Eyes, Sash Chains, Automobile Side Chains, Flat Open Link Chains, Staples, Cotter Pins, Hose Clamps, Etc., and Wire Straighteners, Wire Reels, Frame Bending Machines and Special Presses.

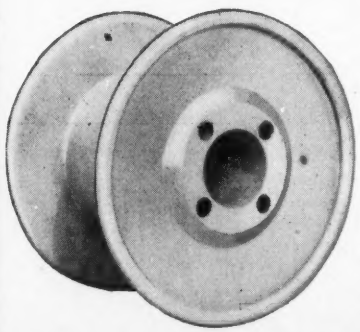
For Complete Details Address—

THE A. H. NILSON MACHINE CO.

BRIDGEPORT, CONN., U. S. A.

FOR HIGHEST SPEEDS





APCO MOSSBERG

PRECISION

STEEL REELS

The reels that are engineered to the job... designed and built by the company that originated the steel reel idea . . . are the reels you should be using in your plant. Every year, more and more Apco Mossberg Steel Reels are bought by quality-minded buyers throughout the wire industry.

FREE

ENGINEERING SERVICE

Without obligation to you, Apco Mossberg engineers will be glad to study your reel problem, and supply complete suggestions, drawings, blue prints. Write for information today.

REELS . . . SPOOLS . . . BOBBINS

APCO MOSSBERG COMPANY

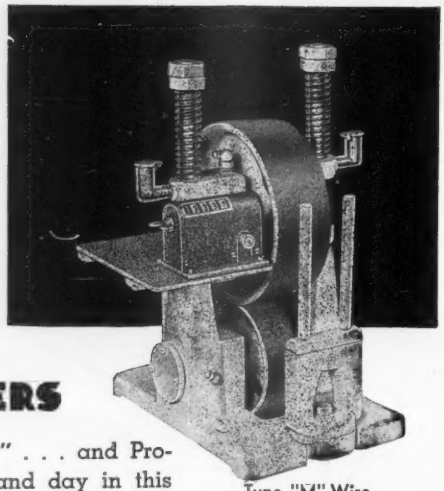
(THE ORIGINAL FRANK MOSSBERG CO.)

21 LAMB ST., . . . ATTLEBORO, MASS.

Speed Production Now!

with

PRODUCTIMETERS



Type "M" Wire Measuring Unit

Winning the war is still a "first" . . . and Productimeters are working night and day in this vast program. For the wire industry they provide accurate count and control of production, one of the vital steps in getting materiel to the many battle fronts.

Are all your machines armed with Productimeters? If not, check now to see how to make them more efficient by the installation of Productimeter Measuring Units. The line is complete . . . with models applicable for various wire processes, and our Engineering Department is at your service to help with your counting problems.

Complete details in Catalog No. 3. Send for your copy today!

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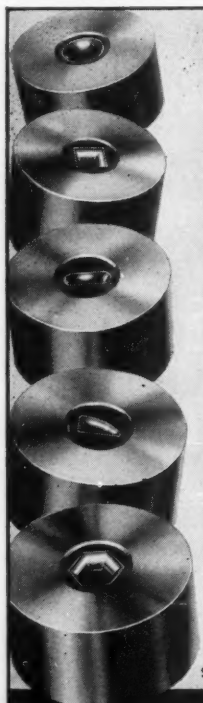


Super-hard . . .

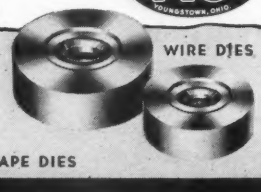
TALIDE DIES

. . . . are producing more and more tonnage records in drawing and extruding wire, rods, bolts, rivets and tubing.

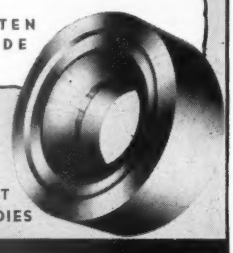
The extra hardness, density and toughness of Talide Nibs insures smoother draws and finer finishes. Enjoy trouble-free, continuous production with the elimination of scoring, galling and frequent die changes.

Talide Dies are available in a wide range of sizes from .010" I. D. Wire Dies to 24" I. D. Sheet Metal Dies —made by the Hot Press Method pioneered and developed by us. Send for catalog 43-WP listing full particulars and prices.

TIPPED WITH TALIDE TUNGSTEN CARBIDE



WIRE DIES



SHAPE DIES

SHEET METAL DIES

METAL CARBIDES CORPORATION

YOUNGSTOWN 5, OHIO

TUNGSTEN CARBIDE TOOLS . DIES . WEAR PARTS

Multi-Purpose Welding Positioner Introduced

(Continued from page 511)

by utilizing the gears that synchronize the disc drive rolls of the transmission. When not required for tilting, oil from the pump flows continuously at reduced pressure to lubricate and cool the drive roll shaft antifriction bearings.

✦ ✦ ✦

TILTING of the table through 135° from the horizontal is controlled by a spring-centered handle which the operator moves through an angle of approximately 45° in the direction of the desired table movement. Automatic limit stops are provided.

✦ ✦ ✦

THE mechanism of the machine is enclosed entirely for safe operation. There are no exposed gears. All moving parts are protected against splash from molten weld rods.

✦ ✦ ✦

THE "Standard" Welding Positioner is 32" long (without motor dimensions) 39½" long (overall with motor), 19" wide and weighs 665 lbs. The table is 28" in diameter, 5/8" thick and rotates on an elevating screw of 2" diameter.

✦ ✦ ✦

New Acco-Loc Safety Splice

AMERICAN Chain & Cable Company, Inc., has announced the development of a new method for splicing preformed wire rope into slings or various assemblies — a method which renders hand-tuck splicing obsolete and unnecessary.

✦ ✦ ✦

THIS method develops a neater and more compact splice than is possible by the hand method. The splice is flexible clear to the terminal, and always develops 100% of the rope's strength. The Acco-Loc Safety Splice does not distort the rope structure and so maintains equalization of stresses in all strands. The splice applies the load stress in direct line with the pull of the load. It has no seizings to loosen, unravel or get in the way; no wire ends to barb and tear workmen's hands. It is wide open for visual inspection at all times. It may be used with any standard fitting (hook, ring, shackle, thimble, etc.), and when the sling or assembly is retired such fittings may be salvaged and reused.

New Booklet on Saran

THIS booklet, entitled "Saran by National for the Electrical Industry", tells of their oriented Saran monofilament, Type B115, designed for braided wire and cable covers.

✦ ✦ ✦

COMPLETE characteristic tables and test results are included, together with properties, strength and yield and chemical resistance charts.

✦ ✦ ✦

SARAN filament is said to be especially outstanding where resistance to abrasion is important, although it embodies many other desirable properties.

✦ ✦ ✦

COPIES may be secured by writing to the National Plastic Products Company, Oderton, Maryland.

✦ ✦ ✦

Handbook on Pickling

A 75-page handbook entitled "Efficient Pickling with Rodine" has been prepared by the **American Chemical Paint Co.**, Ambler, Pa. This is a revision of previous editions.

✦ ✦ ✦

STARTING with a definition of pickling, the book describes pickling and other uses of acid, scale, scid action, the cleaning and rinsing operations, what Rodine is and how it works and covers suggested pickling practices for typical products.

✦ ✦ ✦

DATA, illustrations and charts are used to support the text, making this handbook one that can be of great practical help to a mill man.

✦ ✦ ✦

Entwistle Manufactures Improved Pneumatic Disk Brake

THE **James L. Entwistle Co.** of Pawtucket, Rhode Island, manufacturer of spark-testing equipment, has recently announced manufacture of an improved line of pneumatic disk brakes for use on motors or an any other rotating equipment where a quick, smooth stop is required. These brakes were primarily developed for the Entwistle line of wire reeling and coiling equipment and include an adjustable torque-control unit which permits instantaneous adjustment of

(Please turn to page 514)

TUNGSTEN CARBIDE DIES
for HEADING and
WIRE AND TUBE DRAWING (.030" to 2"),
EXTRUSION (1/16" to 1"), RECUTTING AND
WELDING ELECTRODE COATING.

RING GAUGES
DIAMOND DIES (.0015" up)
DIAMOND POWDER IN ALL GRADES

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As a special service to customers, we are prepared to give three day service on standard wire, tube and extrusion dies in cases of extreme urgency.

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GILRON COATING COMPOUNDS

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These coating compounds are of particular value in the more difficult operations—stainless, alloy, high carbon and welding rod wire. Multiple reductions can be drawn without re-coating.

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Let us confer with you. Write or telephone for particulars.

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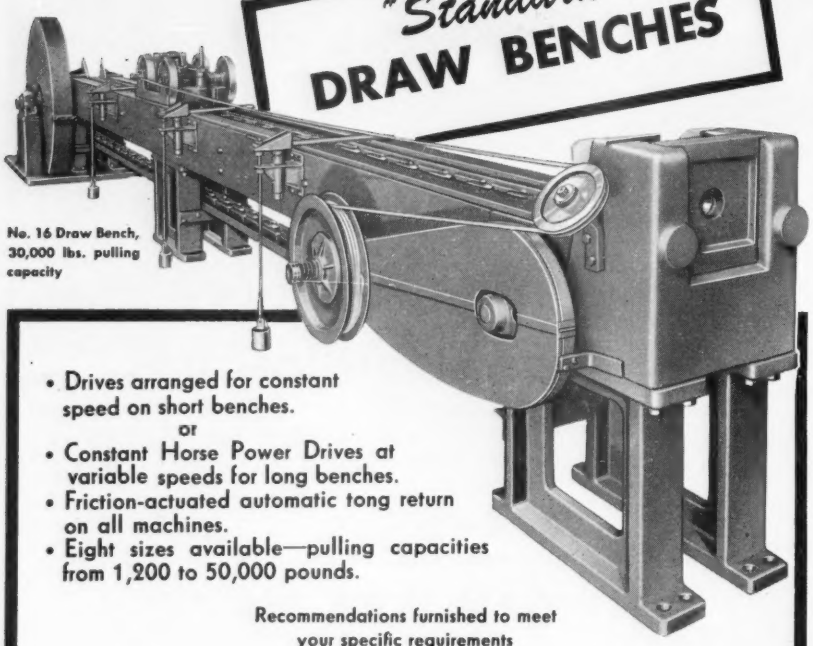
DRAW BENCHES



No. 16 Draw Bench, 30,000 lbs. pulling capacity

- Drives arranged for constant speed on short benches.
  or
- Constant Horse Power Drives at variable speeds for long benches.
- Friction-actuated automatic tong return on all machines.
- Eight sizes available—pulling capacities from 1,200 to 50,000 pounds.

Recommendations furnished to meet your specific requirements

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NORBIDE Abrasive
For Wire Drawing Dies
Cuts Costs 100%

NORBIDE Abrasive is extensively used as a successful medium for cutting and semi-finishing cemented carbide wire drawing dies. NORBIDE is second only to the diamond in hardness yet the abrasive costs but one hundredth as much as diamond powder. In the cutting and finishing of wire drawing dies sizes 220 and 240 are used for ripping, 320F for a semi-polish, 500 to 800 for final finish.

NORBIDE is the registered trade-mark of Norton Boron Carbide

NORTON COMPANY - - Worcester 6, Mass.

NORBIDE *ABRASIVE AND MOLDED PRODUCTS*

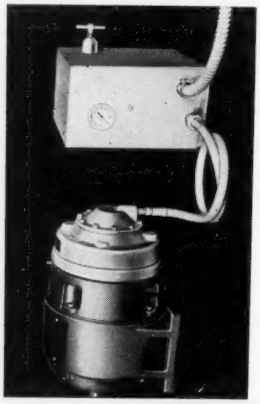
Entwistle Manufactures Improved Pneumatic Disk Brake

(Continued from page 513)

braking torque from any remote position without change of brake adjustment.

✦ ✦ ✦

THE Entwistle brake is about one-half the size of comparable electrically-operated disk brakes, yet has a smooth operating brake torque four to eight times greater. The brake requires no lubrication, has a low maintenance cost due to minimum of rotating parts (only 2 in entire mechanism) and requires no adjustment during the life of the friction disk, the ample wearing surface of which insures long wear before replacement.



J L E Pneumatic Brake and Torque Control Unit. ✦ ✦

✦ ✦ ✦

EASY mounting on any machine where a shaft extension and flat mounting surface can be supplied is another feature of the Entwistle Brake which requires a minimum of air (1/40 cubic foot or less) per operation. Complete absence of packings insures no loss of air through leakage. These brakes are now available with or without the Entwistle Control unit in single, double or triple disk with torque ratings of 100, 200 and 300 lb. feet for operation at pressures up to 125 lbs. per sq. inch for use on N. E. M. A. Brake Frame motors and on any other rotating machinery.

✦ ✦ ✦

FOR further information and specifications, address the James L. Entwistle Co., 43 Church St., Pawtucket, Rhode Island.

The Wire Association Los Angeles Regional Meeting

CONGRATULATIONS to **Ken Davis,** President of the K. H. Davis Wire & Cable Corp., Los Angeles, California, who acted as Chairman of a most successful Los Angeles Regional Meeting, held at the Los Angeles-Biltmore Hotel, Los Angeles, on Friday, June 8, 1945.

✦ ✦ ✦

THE arrangements made by Mr. Davis for handling the hotel and the meeting worked out very smoothly and most satisfactorily. With an attendance limit placed on the meeting of 50 because of war-time conditions, there was an over-capacity house of 51. The list of attendance is shown below.

✦ ✦ ✦

THE meeting was devoted entirely to the handling of contracts and inspection of materials by the Signal Corps and the speakers were **Major Washburn,** Chief of the Procurement Division of the Los Angeles Office of the Signal Corps, and **Major Hartman,** Chief of the Pacific Coast Inspection Division of the Signal Corps. Both addresses were most informative and packed with information of value to companies having Government contracts with the Signal Corps, and much valuable data was obtained by those present.

✦ ✦ ✦

FOLLOWING the speakers, there was a sound color motion picture showing the building of the military telephone lines in Newfoundland. This was most interesting as many improvised gadgets were used in erecting the long line transmission cables and these were all demonstrated in the film.

✦ ✦ ✦

PRECEDING the meeting there was a get-together in the early afternoon and before the dinner, and the entire session was voted a great success by all who attended.

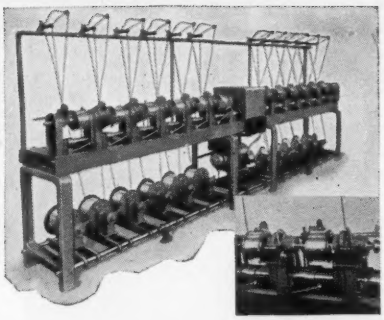
✦ ✦ ✦

ATTENDANCE LIST
Los Angeles Regional Meeting

BABCOCK, D. F.
Firth-Sterling Steel Co.
1327 Santa Fe Avenue, Los Angeles.
BABROS, J. H. Partner,
Pacific Coast Wire & Iron Works,
3110 S. Main St., Los Angeles.
BARLOW, ROGER S., Chief Engineer,
Phelps Dodge Copper Products Corp.,
6100 Garfield Ave., Los Angeles.

(Please turn to page 516)

For users of wire
another
FIDELITY
MACHINE
THAT MULTIPLIES
MANPOWER



Every winding head equipped with large-figure footage counters, conveniently located for inspection and control by operator.

This double-end, screw traverse FIDELITY Wire Spooling Machine is a high production unit. It winds wire at the rate of 600 to 700 feet per minute per spool.

On the 12-head machine illustrated, this totals about one and one-half miles per minute. Allowing time for changing spools, this makes possible the winding of 600 or more miles per 8-hour shift.—Accommodates spools up to 9¼" diameter. Adjustments for tension, flange variations and spool sizes. This same machine built in units handling 4-6-8-10 and 12 spools.

FIDELITY'S comprehensive line of wire winding and wire covering machines is described in a new 20-page catalog. Write for it.

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Intricate, Automatic Precision Machines
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MORE PRODUCTION
IN LESS TIME *with*
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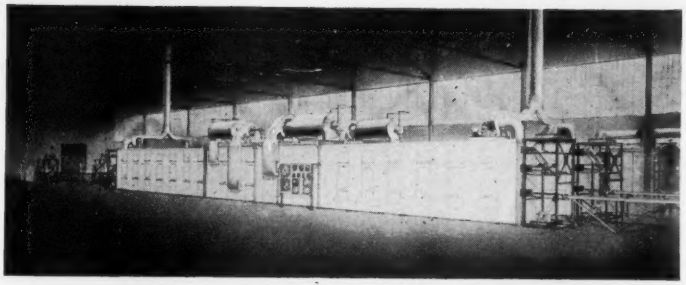
CARL-MAYER HI-SPEED
ROD BAKER

The fastest rod baker built! Saves up to 50% in time and fuel. Patented Blow-Off Feature removes moisture without bumping or agitating the coils. **Patented and patents pending.**



WELDING ROD OVEN

For drying coated welding rods. Uses the "Mayer" Recirculating Gas Fired Air Heater principle and Rod Transfer Systems (patents pending).

Growing interest in our type of equipment is evidenced by Carl-Mayer installations in such plants as:—

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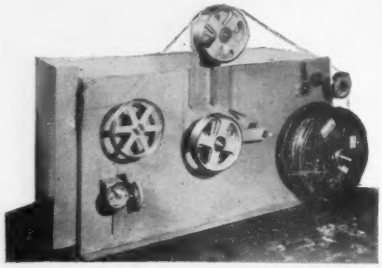
THE CARL-MAYER CORPORATION 3030 EUCLID AVENUE CLEVELAND, OHIO



A compact Take-up for Wire, Synthetic Cords, etc., for use in connection with Extrusion Machine, or process operations, etc.

Reel Speed synchronized hydraulically, Constant Speed Capstan and Adjustable Constant Tension with Adjustable Traverse, Welded Frame, Ball-Bearing throughout and built-in Motor Drive.

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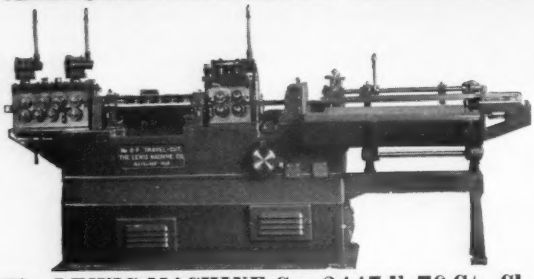

Machines for 1/16" to 3/4" rod
Round
Square
Flat
Hexagon
Ferrous and Non-Ferrous

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High Speed
Heavy Duty

The Sign of Dependable Service:

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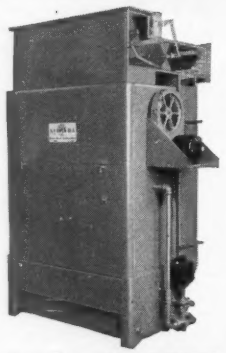

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Wire Association Los Angeles Regional Meeting

(Continued from page 515)

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Los Angeles.

BELLEFONTAINE, DAN, Engineer,
California Spring Co.,
1746 S. Los Angeles St., Los Angeles.

BOWERS, C. F., President,
Tri-State Electric Co.,
Los Angeles.

CADE, R. R., Die Room Foreman,
K. H. DAVIS WIRE & CABLE CORP.,
2417 E 23rd Street, Los Angeles.

CHRISTIE, C. I., Production Manager,
K. H. DAVIS WIRE & CABLE CORP.,
2417 E 23rd Street, Los Angeles.

CHRISTIE, CHAS. I.,
Firth-Sterling Steel Co.,
1327 Santa Fe Ave., Los Angeles.

COFFIELD, RAY E., Prod. Control,
California Spring Co.,
1746 S. Los Angeles St., Los Angeles.

COFFIN, BUD,
Columbia Steel Co.,
Pittsburg.

CONLAN, J. F., Office Manager,
K. H. Davis Wire & Cable Corp.,
2417 E. 23rd Street, Los Angeles.

CRAIG, HARVEY, Dist. Sales Mgr.,
Republic Steel Corp.,
610 Edison Bldg., Los Angeles.

DAVIS, K. H., President,
K. H. Davis Wire & Cable Corp.,
2417 E 23rd Street, Los Angeles.

DOODY, JACK, (Sales),
Carboloy Company, Inc.,
5905 Pacific Blvd., Huntington Park.

EGAN, JACK,
Bethlehem Steel Co.,
Box 2057 Terminal Annex, Los Angeles.

FINLAYSON, GEO., Foreman,
Phelps Dodge Copper Products Corp.,
6100 Garfield Ave., Los Angeles.

FIONDELLA, JOE, Supt., Rope Dept.,
K. H. Davis Wire & Cable Corp.,
2417 E. 23rd Street, Los Angeles.

GLENDINNING, WALTER, Asst. Supt.,
Phelps Dodge Copper Products Corp.,
6100 Garfield Ave., Los Angeles.

HAMMOND, E. H., JR.,
Western Insulated Wire Co,
1001 E. 62nd Street, Los Angeles.

HARTMANN, PAUL, MAJOR, Chief,
Pacific Coast Inspection Division,
Signal Corps, Los Angeles.

HEAVRIN, GEO., Asst. Mgr.
California Spring Co.,
1746 S. Los Angeles St., Los Angeles.

HENDERSON, E. S., Asst. Mdse. Director,
Ducommun Metals & Supply Co.,
4890 S. Alameda St., Los Angeles.

KAMADA, JOE, Partner,
Pacific Coast Wire & Iron Works,
3110 S. Main St., Los Angeles.

KENT, W. H., Asst. Supt.,
Phelps Dodge Copper Products Corp.,
6100 Garfield Ave., Los Angeles.

KILLIAN, G. L., Owner,
Acme Wire & Steel Co.,
4068 Avalon Blvd., Los Angeles.

KINCH, CLARENCE,
California Spring Co.,
1746 S. Los Angeles St., Los Angeles.

KLOSSNER, L. W., Plant Mgr.,
General Cable Corporation,
3600 E. Olympic Blvd., Los Angeles.

LEWIS, E. H.,
Western Insulated Wire Co.,
1001 E. 62nd Street, Los Angeles.

LUHRS, A. F., Superintendent,
K. H. Davis Wire & Cable Corp.,
2417 E. 23rd Street, Los Angeles.

MACK, RAY D., Pacific Dist. Mgr.,
Carboloy Company, Inc.,
5905 Pacific Blvd., Huntington Park.

MEAD, L. W., Asst. Pacific Mgr.,
Firth-Sterling Steel Co.,
1327 Santa Fe Ave., Los Angeles.

MORGAN, JAMES L., Industrial Engr.,
K. H. Davis Wire & Cable Corp.,
2417 E. 23rd Street, Los Angeles.

MOZENA, ROBERT E., Salesman,
Wickwire Spencer Steel Co.,
1111 Park Central Bldg., Los Angeles.

MUNGALL, R. W., Plant Manager,
Essex Wire Corporation,
P.O. Box 30, Anaheim.

MURPHY, JOHN E., Sales,
California Spring Co.,
1746 S. Los Angeles St., Los Angeles.

NABORS, VANCE R.,
Ducommun Metals & Supply Co.,
4890 S. Alameda St., Los Angeles.

NELSON, A. N.,
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(Please turn to page 519)

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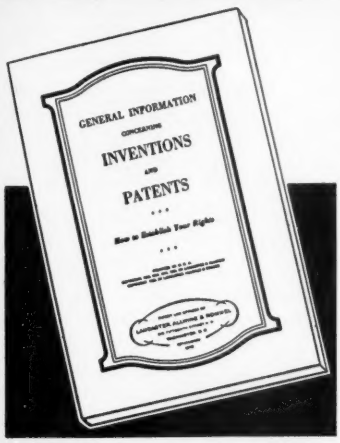

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Patenting an Invention

(Continued from page 498)

tion for novelty of invention. They consider all that other inventors have done in the field to which the particular invention of the application relates. This thorough examination has made our patent system so outstanding that it has been copied in other foreign countries.

✦ ✦ ✦

AFTER the application has been prepared and executed by the inventor it is filed in the United States Patent Office, together with the Government filing fee, which at the present time amounts to $30.00. A filing receipt is issued by the Government identifying the application by its filing date and giving it a serial or identification number, which is forwarded to the inventor.

✦ ✦ ✦

THE application is initially examined by an Assistant Examiner, who after formulating his views with respect to an action, discusses them with the Primary Examiner. Their decision is placed in writing and is forwarded to the attorney. This decision is known as an "Office Action" and in it the Examiner mentions any prior art patents or publications which disclose any similar inventions. In this Office action the Examiner states his reason for rejecting each one of the claims of the application. Any claims found allowable are so stated in the Office action.

✦ ✦ ✦

IF the attorney after receiving the Examiner's Office action does not agree that the prior art patents or publications cited by the Examiner anticipate the claims against which such references are cited, the attorney makes a reply to the Examiner in the form of an argument analyzing the prior art patents or publications. In this argument the attorney points out to the Examiner the difference between applicant's invention, as claimed, and the prior patents or publications cited by the Examiner. This form of discussion continues back and forth between the attorney and the Primary Examiner until they have mutually decided upon the claims which are deemed to properly

(Please turn to page 518)

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The Easy Way --

including spring wire, wire fabrics, tie wire, etc., easily and quickly. Porter cutters save time and labor. Portable, hand-power — used anywhere in shop, factory, warehouse or out on a job.

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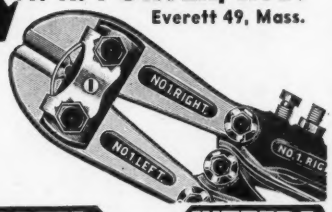

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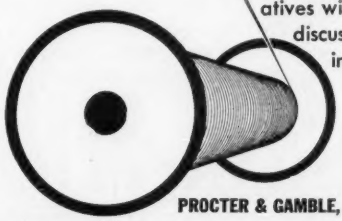

PROCTER & GAMBLE, CINCINNATI, O.

Patenting an Invention

(Continued from page 517)

protect the invention. If they cannot mutually agree, an appeal can be taken to the Board of Appeals in the United States Patent Office, and thereafter to the Court of Customs and Patent Appeals, or the District Court of the U. S. for the District of Columbia.

✦ ✦ ✦

IT happens frequently that different inventors file applications in the Patent Office upon inventions which are so similarly related that both inventors can claim the same invention. In this instance a proceeding known as an "interference" is established within the Patent Office. The primary object of this proceeding is to determine who was the first actually to conceive of the invention and actually reduced the invention to practice, or **with diligence** constructively reduced the invention to practice by the filing of an application in the Patent Office. No attempt will be made in this article to discuss the intricacies of interference procedure since it is only in a small number of instances that applications for patents are filed upon similar inventions by rival inventors.

✦ ✦ ✦

The Value of a Patent

THE value of a patent grant depends largely upon the position which the invention occupies in industry, supplemented by the zeal with which the inventor or the owner of the patent promotes the invention. Only an inventor can file an application for patent. He must sign the application and execute the oath which accompanies it. Concurrent with the filing of the application the inventor is at liberty to assign the invention to any other individual or individuals or to a firm, company, or corporation. He may dispose of any percentage of his interests whatsoever to other individuals or to a firm, company or corporation.

✦ ✦ ✦

THE inventor is at liberty to retain legal title to his application and patent after it is granted and to license others to make, use and/or sell the invention. He may grant an **exclusive** license or may grant what is known as a "non-exclusive" license. In the latter event, the inventor is at liberty to grant any number of licenses to others to make, use and/or sell the invention.

✦ ✦ ✦

THE inventor's remuneration may take the form of any consideration which is legal. Usually the consideration is in the form of money, either in a lump sum or by way of royalty.

✦ ✦ ✦

THE value of patent protection to industry has never been more appreciated than at the present time. That is true because the United States Supreme Court in the Glass Industry case decided January 8, 1945, has reaffirmed long established principle which in recent years have been under certain governmental attack. This decision reestablishes that patents are property, and as such are entitled to constitutional protection in that the patentee has the right to use or not to use the invention, to license or not to license it, and to license some and not license others, as he sees fit.

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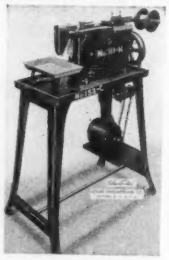

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✦ ✦ ✦

Editor's Note

WE recently were the recipients of a very fine set of technical catalogs and books on the subject of "Brass" and "Copper". These were supplied by the COPPER DEVELOPMENT ASSOCIATION, Grand Buildings, Trafalgar Square, London, W. C. 2, England. The temporary war-time address is 9, Bilton Road, Rugby, Warwickshire, England. The titles of the catalogs are as follows:

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"Steel-Cored Copper Conductors"
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"Brasses, and Other Copper-Zinc Alloys"
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✦ ✦ ✦

ANY of these publications will be furnished gladly by application to the COPPER DEVELOPMENT ASSOCIATION.

✦ ✦ ✦

WILLIAM Turner MacLellan, C.B.E., Chairman of the Lancashire Wire Co., Ltd., of Manchester, England, died on May 3, 1945. He had been with the Company for thirty-two years, and had been Chairman also of P. & W. MacLellan of Glasgow and the Bengel Iron Company of India.

ATTENTION
Wire Association Members

AT the Convention in October it is planned tentatively, for the greater convenience of members, to group similar subjects together in the same sessions. In furtherance of this plan, one session will be set aside for the informal discussion of various new products and practices, some of which will have been introduced in the usual way by written papers, and some not. The program committee would like suggestions from members as to matters they would like to hear talked over. Please send them to the chairman,

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The Successful Finishing of Electrically Insulated Wire and Cable

(Continued from page 489)

We are not concerned with either of these phenomena in this writing. The saturants and lacquers under discussion are essentially non-oxidizing and non-polymerizing at all but extremely high temperatures.

✦ ✦ ✦

THE controlling factor in speed of operation—feet coated per hour—is the ability of the finish to dry between the point of application and the top sheave sufficiently to avoid excessive deformation and actual sticking.

✦ ✦ ✦

TO prevent the surface of the coating from becoming soft, if not actually sticky, the air laden with the solvent vapors must be removed from the drying chamber quickly. It must not be permitted to circulate around the partially coated wire.

✦ ✦ ✦

THE mechanics for accomplishing this are quite simple but in the past, they have not always been utilized to their fullest advantage. A study of the line drawing of a coating oven using the forced convection system illustrates the principles here advocated, (Figure 5). Solvents from deposited films evaporate fastest and in greatest quantity immediately after application. Rapid removal at this point is necessary to prevent the aura of fumes around the drying coating from retarding further solvent evaporation and keeping the surface in a sticky condition.

✦ ✦ ✦

INTRODUCTION of air on the down-side of the apparatus and evacuation on the up-side removes the evaporating solvent at its highest point of concentration. This principle of air flowing counter to the direction

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of the wire prevents the circulation of evaporated solvent vapors with the moving strand. As it travels around the tower, less and less solvent vapor remains to be evaporated and this is successively removed by the counter-flowing air stream.

✦ ✦ ✦

WHAT is the optimum velocity of the air stream? This factor must be determined in the particular coating tower for the finish being applied. When no appreciable increase in efficiency (feet coated per time unit) is apparent for an increase in velocity, the optimum point has been reached. Fast evaporating solvents require less air velocity than the solvents having a slow rate of evaporation.

✦ ✦ ✦

ONE thing is certain, up to the limitation of the apparatus, increased air velocity means increased yields.

✦ ✦ ✦

NOW that the principles of the mechanical removal of evaporating solvents have been discussed, the method of increasing this evaporation must be considered. Heat is applied to increase the evaporation rate of the volatile portion. It also prevents the dew-point being reached as the fast evaporation of solvents chill the surface of the coating. This would (and does) cause blushing through precipitation of moisture on the partially dried lacquer surface.

✦ ✦ ✦

HEAT must be used carefully or its possible disadvantages will far outweigh its merits. Operators experienced in the application of protective coatings know that with few exceptions, wet surfaces cannot immediately be introduced into hot ovens without causing blisters or pinholes. The faster drying the finish, the more conservative must be the use of heat. In the heating of finishes on braided wires, another factor

(Please turn to page 522)

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The Successful Finishing of Electrically Insulated Wire and Cable

(Continued from page 521)

must be considered. This is the space in the braid which may form an expansion chamber to cause blistering when the film becomes continuous.

✦ ✦ ✦

WHAT then is the optimum temperature at which to introduce the air? The experience of the industry is that 150°F is near the upper limit to prevent defects in the film. The actual heat may vary with the tower construction. A long tower may use maximum heat because the coats preceding those which form a continuous film are dryer and thus have less solvent to vaporize rapidly enough to cause blisters when the coating becomes continuous.

✦ ✦ ✦

IT is true that temperatures up to 180°F have been used without causing apparent blistering on thin finishes applied to wires of small diameter. Since there is a small amount of solvent retained during the drying period, the finish is quite thermoplastic. Passage over the sheaves and take-up mechanism flattens the hot coating to an extent which leaves the reeled strand in an oval shape. Protection is diminished on the flat side because of the extremely thin film.

✦ ✦ ✦

AS the film thickness is increased, more care must be exercised in the application of heat. Thicker films such as are used on ignition cable, often as high as 15 mils, are much more vulnerable to high temperature, as they retain more solvent both in the braid and in the film itself. Opinion in the industry indicates that 140 to 150° F. with adequate air flow is the maximum top safe temperature to use.

✦ ✦ ✦

IN passing, saturating compounds may be dried in the same apparatus as lacquers. However, since the saturant penetrates the braid, it is held in mechanically. Consequently, saturated wire should be given a few passes through the tower for complete drying before applying the lacquer coating.

✦ ✦ ✦

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maximum rate depends on (1) the wire diameter, (2) the film thickness desired and (3) the efficiency of the coating apparatus. In general, wires of small diameter receiving thin coatings may be run as fast as 10,000 feet per hour. On the other hand, large cables may run as slowly as 120 feet per hour.

✦ ✦ ✦

THIN films are easy to apply at high speed because the finish stays open longer thus eliminating the danger of blistering. By the time the last few coats cause sealing or the formation of a continuous film, the strand is removed from the apparatus consequently relieving internal pressure due to solvent evacuation through heat.

✦ ✦ ✦

HEAVIER films must be dried well "en route" to prevent accumulation of solvent. Ignition wires carrying up to a fifteen mil wall of protective coatings are rarely run faster than 1,000 feet per hour.

✦ ✦ ✦

IT is quite possible to coat certain finishes in heavy films at speeds up to 3,000 feet per hour provided the partially dried coating is not tightly reeled. This procedure requires lower temperature and a high rate of air flow to prevent blistering. The finished product leaves the coating apparatus with a smooth surface and is collected by permitting it to fall into a large open container. After further drying at room temperature, it is reeled. Braid marks caused by final solvent loss show through the finish but this does not weaken the protective characteristics of the film. The ability of a finish to stand such treatment depends on its inherent non-sticking properties and its good film strength even when incompletely dry.

✦ ✦ ✦

HIGH speed has a tendency to stretch small diameter wires, hollow sleeving or flexible tubing. Consideration must be given to this factor when increased production is required.

PART III of this article will appear in the August 1945 issue of WIRE & WIRE PRODUCTS.

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WHERE TO BUY

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ABRASIVES—
Norton Co., Worcester, Mass.

ACID INHIBITORS—
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

ACID-PROOF CONSTRUCTION—
Ceilcote Co., The, Cleveland, Ohio
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio
Nukem Products Co., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

AIR DRAW FURNACES—
Carl-Mayer Corp., The, Cleveland, Ohio.

ALKALINE CLEANERS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

ANNEALING MACHINES—
Open Flame
Syncro Machine Co., Perth Amboy, N. J.

ANNEALING POTS AND BOXES—
National Annealing Box Co., Washington, Penna.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.

ARMORING EQUIPMENT—
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

BAKERS—Flash
Morrison Engineering Corp., Cleveland, Ohio

BAKERS—Rod and Wire
Carl-Mayer Corp., The, Cleveland, Ohio
Morgan Construction Co., Worcester, Mass.
Morrison Engineering Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., N. Y., N Y

BELTS—Wire
Wickwire Spencer Co., New York, N. Y.

BENDERS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BOBBINS—Braider & Wire Weaving
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co, Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

BORON CARBIDE—
Norton Co., Worcester, Mass.

BRAKES & SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

BRICKS—Acid Proof
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Co., Buffalo, N. Y.

CABLE LACQUERING OVENS
Industrial Oven Engr. Co., Cleveland, Ohio.

CABLE—Steel and Copper
Bethlehem Steel Co., Bethlehem, Pa.
Driver Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Wickwire Spencer Steel Co., New York, N.Y.

CARRIERS—Braider, High Speed
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.

CASTINGS—Wire Mill
Scudder, E. J., Fdry. & Machine Co., Trenton, N. J.

CEMENTS—Acid Proof
Sauereisen Cement Co., Pittsburgh, Pa.

CEMENTS—Refractory
Norton Co., Worcester, Mass.

CHEMICALS—Cleaning
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANERS—Hand and Metal
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

CLEANING & PICKLING EQUIP.
Broden Construction Co., Cleveland, O.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Haveg Corporation, Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Nukem Products Corp., Buffalo, N. Y.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

CLOTH TESTERS—
Scott Testers, Inc., Providence, R. I.

CLOTH—WIRE, All Metals
Roebling's, John A. Sons, Co., Trenton, N. J.
Wickwire Spencer Steel Co., New York, N. Y.

COATING COMPOUNDS—
Apex Alkali Products Co., Philadelphia, Pa.
Gilron Products Co., Cleveland, Ohio.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H.. Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

COILERS—Sheet, Strip and Wire
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

COLD HEADERS—
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

COMPOUNDS—Coppering
American Chemical Paint Co., Ambler, Pa.

COMPOUNDS—Metal Finishing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

COMPOUNDS—Rust Preventing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Oakite Products, Inc., New York, N. Y.

COMPOUNDS—Rust Removing
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds, Inc., Chicago, Ill.

COMPOUNDS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Gilron Products Co., Cleveland, Ohio.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

CONTROLS—Heat Treating
Niagara Blower Co., Buffalo, N. Y.

COPHOLDERS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

CRANES—Wire Mill
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

CUTTING TOOLS—Carbide
Carboloy Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Vascoloy-Ramet Corp., North Chicago, Ill.

CUTTING TOOLS—Wire
Porter, H. K., Inc., Everett, Mass.

DIAMONDS—Industrial
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vianney Wire Die Wks., New York, N. Y.

DIAMOND POWDERS—
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIAMOND TOOLS—
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.

DIES—Diamond
Ajax Industrial Supplies, Inc., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Cochaud Wire Die Corp., New York, N. Y.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
United Die Co., Newark, N. J.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.

DIES—Lead Extrusion
Carb-Tung Products, Inc., Brooklyn, N. Y.
Robertson, John, Co., Brooklyn, N. Y.

DIES—Repairs & Re-Cutting
Ajax Industrial Supplies Co., Fort Wayne, Ind.
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Cochaud Wire Die Corp., New York, N. Y.
Carb-Tung Products, Inc., Brooklyn, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Ft. Wayne Wire Die, Inc., Fort Wayne, Ind.
Hartley Wire Die, Thomaston, Conn.
Indiana Wire Die Co., Fort Wayne, Ind.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Metal Carbides Corp., Youngstown, Ohio.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Wayne Wire Die Co., Hillside, N. J.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Rod and Tube Drawing
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Carb-Tung Products, Inc., Brooklyn, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Hartley Wire Die, Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Metal Carbides Corp., Youngstown, Ohio.
Michigan Wire Die Co., Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tantalum Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Carb-Tung Products, Inc., Brooklyn, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Hartley Wire Die, Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Metal Carbides Corp., Youngstown, Ohio.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DIES—Tungsten Carbide
Balloffet Dies & Nozzle Co., Inc., Guttenberg, N. J.
Carboloy Co., Inc., Detroit, Mich.
Carb-Tung Products, Inc., Brooklyn, N. Y.
Firth-Sterling Steel Co., McKeesport, Pa.
Hartley Wire Die, Thomaston, Conn.
Kelly Wire Die Corp., New York, N. Y.
Luginbill Wire Die Co., Fort Wayne, Ind.
Michigan Wire Die Works, Detroit, Mich.
Rusch Wire Die Corp., Croton-on-the-Hudson, N. Y.
Tungsten Electric Corp., Union City, N. J.
United Die Co., Newark, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.
Vianney Wire Die Wks., New York, N. Y.
Willey's Carbide Tool Co., Detroit, Mich.

DRAW BENCHES—
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Foundry & Machine Co., Trenton, N. J.
Standard Machinery Co., Providence, R. I.
Vaughn Machinery Co., Cuyahoga Falls, O.

DRUMS—Flange Steel
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.

DRUMS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

DRYING & PRE-HEATING ROOMS
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

DRYING EQUIPMENT
Carl Mayer Corp., Cleveland, Ohio.

ELECTRIC RESISTANCE HEATING
Trauwood Engr. Company, Cleveland, Ohio.

ENGINEERS—Consulting Wire Mill
Lewis, Kenneth B., Worcester, Mass.
Wiel, L. D., New York, N Y.

EQUIPMENT—Humidifying
Niagara Blower Co., Buffalo, N. Y.

EQUIPMENT—Insulation Testing
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, James L., Co., Pawtucket, R. I.

EYELETS—Brass or Zinc
Platt Bros. & Co., The, Waterbury, Conn.

FENCES AND FENCING—Wire
Wickwire Spencer Steel Co., New York, N.Y.

FIREBRICK REFRACTORIES—Brick and Cement
The Babcock & Wilcox Co., New York 6, N.Y.

FLUXES—Soldering
American Chemical Paint Co., Ambler, Pa.

FOAM PRODUCING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Parkin, Wm. M., Co., Pittsburgh, Pa.

WHERE TO BUY, Continued

FRICTION PAY-OFF STANDS—
Industrial Oven Engr. Co., Cleveland, Ohio.

FURNACES—Annealing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Automatic
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Brazing
Electric Furnace Co., Salem, Ohio.
Firth-Sterling Steel Co., McKeesport, Pa.

FURNACES—Bright Annealing
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

FURNACES—Electric
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio.

FURNACES—Galvanizing Equip.
Electric Furnace Co., Salem, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Hard'ing & Temp'ing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engr. Company, Cleveland, Ohio.

FURNACES—Lead Melting
Electric Furnace Co., Salem, Ohio.
Robertson, John, Co., Brooklyn, N. Y.
Surface Combustion Corp., Toledo, Ohio.

FURNACES—Non-Oxidizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Wilson, Lee, Engineering Co., Cleveland, O.

FURNACES—Normalizing
Carl-Mayer Corp., The, Cleveland, Ohio.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., Cleveland, Ohio

FURNACES—Salt Bath
Electric Furnace Co., Salem, Ohio.
Surface Combustion Corporation, Toledo, Ohio.

FURNACES—Wire, Strip & Sheet
Carl-Mayer Corp., The, Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Electric Furnace Co., Salem, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Surface Combustion Corp., Toledo, Ohio.
Trauwood Engineering Co., Cleveland, Ohio
Wilson, Lee, Engr. Co., Cleveland, Ohio.

GALVANIZING KETTLES
National Annealing Box Co., Washington, Penna.

GRINDERS—Roll
Norton Co., Worcester, Mass.

HOISTS—Electric Travelling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

INHIBITORS—Pickling
American Chemical Paint Co., Ambler, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

INSULATING LACQUERING SYSTEMS—Continuous
Industrial Oven Engr. Co., Cleveland, Ohio.

INSULATING MATERIALS—
Anger Sales Corp., Framingham, Mass.
Crepe-Kraft Co., Newark, N. J.
Dobeckmun, The, Co., Cleveland, Ohio.

KETTLES—Galvanizing, Annealing, Tinning, etc.
National Annealing Box Co., Washington, Penna.

LATHES—Die Reaming
Carboloy Co., Inc., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Morgan Construction Co., Worcester, Mass.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry & Machine Co., Waterbury, Conn.

LININGS—Acid and Alkali Proof
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

LUBRICANTS—For Metal Cutting, Stamping and Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

LUBRICANTS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

MACHINERY—Armoring (Cable, Wire Hose)
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Robertson, John, Co., Brooklyn, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Braiding
Fidelity Machine Co., Philadelphia, Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Brazing
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Bunching
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Bundling, Scrap
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Watson Machine Co., Paterson, N. J.

MACHINERY—Cable, Electric
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Chain Making
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Closing
New England Butt Co., Providence, R. I.
Watson Machine Co., Paterson, N. J.

MACHINERY—Coil Winding
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY— Coilers
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J. (for Tungsten Wire)
Morgan Construction Co., Worcester, Mass.
New England Butt Co., Providence, R. I.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Copper Wire Drawing and Rolling
American Insulating Mach'y Co., Phila., Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Covering Wire
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
Royle, John & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Cutting
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Inc., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Porter, H. K., Inc., Everett, Mass.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Die Making
Carboloy Co., Detroit, Mich.
Firth-Sterling Steel Co., McKeesport, Pa.
Roos, H. & G., Tool & Mfg. Co., Montclair, N. J.

MACHINERY—Draw Benches
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Edging
Broden Construction Co., Cleveland, Ohio.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Enameling
American Insulating Mach'y Co., Phila., Pa.
Industrial Oven Engineering Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Extruding
Robertson, John, Co., Brooklyn, N. Y.
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Fence
Broden Construction Corp., Cleveland, Ohio
Glader, Wm., Machine Works, Chicago, Ill.

MACHINERY—Filament Coil Winding
Eisler Engineering Co., Newark 3, N. J.

MACHINERY—Fiat Wire
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY— Forming
Eisler Engineering Co., Newark 3, N. J.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Galvanizing
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Galvanizing Wire
Broden Construction Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.
Wilson, Lee, Engr. Co., Cleveland, Ohio.

MACHINERY—Gang Winders
Fidelity Machine Co., Philadelphia, Pa.
Ruesch, H. J., Machine Co., Newark, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Grinding
Norton Co., Worcester, Mass.

MACHINERY—Insulating
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Knitting
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Lead Encasing Presses, etc.
Robertson, John, Co., Brooklyn, N. Y.

MACHINERY—Lead Stripping
Robertson, John, Co., Brooklyn, N. Y.
Watson Machine Co., Paterson, N. J.

WHERE TO BUY, Continued

MACHINERY—Lock Washer
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Magnet Wire
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Material Handling
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

MACHINERY—Measuring Wire & Cable
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Brockton, Mass.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Nail and Tack
Broden Construction Co., Cleveland, Ohio.
Glader, Wm., Machine Works, Chicago, Ill.
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Panning
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Pointing
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Quill Winding
Fidelity Machine Co., Philadelphia, Pa.

MACHINERY—Rod Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
Ruesch, H. J., Machine Co., Newark, N. J.

MACHINERY—Rolling Mill
Broden Construction Co., Cleveland, Ohio.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Rubber for Insulating Wire
Royle, John, & Sons, Paterson, N. J.

MACHINERY—Rubber Tubing and Straining
New England Butt Co., Providence, R. I.
Royle, John, & Sons, Paterson, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Screw Wire
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Special
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Emory, Robert J., Co., Newark, N. J.
New England Butt Co., Providence, R. I.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I. (Special Designs)
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spooling
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Emory, Robert J., Co., Newark, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Spring Making
National Machinery Exchange (Used), New York, N. Y.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Staple
Sleeper & Hartley, Inc., Worcester, Mass.

MACHINERY—Straightening
Broden Construction Co., Cleveland, Ohio.
Lewis Machine Co., The, Cleveland, Ohio.
Moslo Machinery Co., Cleveland, Ohio.
National Machinery Exchange (Used), New York, N. Y.
Nilson, A. H., Machine Co., The, Bridgeport, Conn.
Ruesch, H. J., Machine Co., Newark, N. J.
Shuster, F. B., Mfg. Co., New Haven, Conn.
Sleeper & Hartley, Inc., Worcester, Mass.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Stranding
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Strip Steel
Broden Construction Co., Cleveland, Ohio.
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Swaging
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Taping
American Insulating Mach'y Co., Phila., Pa.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Testing Equipment—Sparkers
Davis, R. L., Electric Co., Wallingford, Conn.
Entwistle, Jas. L., Pawtucket, R. I.

MACHINERY—Testing Spring
Standard Machinery Co., Providence, R. I.

MACHINERY—Tinsel Rolling Mills
American Insulating Mach'y Co., Phila., Pa.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co., Torrington, Conn.

MACHINERY—Trolley Wire
Torrington Mfg. Co., Torrington, Conn.
Vaughn Machinery Co., Cuyahoga Falls, O.

MACHINERY—Tube Mill
Ruesch, H. J., Machine Co., Newark, N. J.
Torrington Mfg. Co, Torrington, Conn.

MACHINERY—Welding Wire
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Winding
American Insulating Mach'y Co., Phila., Pa.
Eisler Engineering Co., Newark 3, N. J.
Fidelity Machine Co., Philadelphia, Pa.
New England Butt Co., Providence, R. I.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.
Torrington Mfg. Co, Torrington, Conn.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wind-up
Entwistle, Jas. L., Co., Pawtucket, R. I.
Industrial Oven Engr. Co., Cleveland, Ohio.

MACHINERY—Wire Bending
Eisler Engineering Co., Newark 3, N. J.
Nilson, A. H., Co., Bridgeport, Conn.
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

MACHINERY—Wire Drawing
American Insulating Mach'y Co., Phila., Pa.
Broden Construction Co., Cleveland, Ohio.
Eisler Engineering Co., Newark 3, N. J.
Morgan Construction Co., Worcester, Mass.
National Machinery Exchange (Used), New York, N. Y.
Ruesch, H. J., Machine Co., Newark, N. J.
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.
Standard Machinery Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Vaughn Machinery Co., Cuyahoga Falls, O.
Waterbury-Farrel Fdry. & Mach. Co., Waterbury, Conn.

MACHINERY—Wire Measuring
Durant Mfg. Co., Milwaukee, Wis.
Lyon-Vail Machine Co., Inc., Brockton, Mass.
New England Butt Co., Providence, R. I.

MACHINERY—Wire Rope
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.
Watson Machine Co., Paterson, N. J.

MACHINERY—Wire Tinning
American Insulating Mach'y Co., Phila., Pa.
New England Butt Co., Providence, R. I.
Syncro Machine Co., Perth Amboy, N. J.

MACHINERY—Wood Screw
National Machinery Exchange (Used), New York, N. Y.

MATERIAL HANDLING EQUIP.
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, O.

MILLS—Tandem Rolling and Edging
Standard Machinery Co., Providence, R. I.
Torrington Mfg. Co, Torrington, Conn.

NAILS—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburg, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

NICKEL SILVER AND PHOSPHOR BRONZE—Rod, Wire and Strip
Hudson Wire Co., Ossining, N. Y.

OILS—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Miller, R. H., Co., Inc., Homer, N. Y.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

OVENS—Cable Lacquering
American Insulating Mach'y Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, Ohio.
Morrison Engineering Corp., Cleveland, Ohio

OVENS—Dehydrogenizing
Carl-Mayer Corp., Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.

OVENS—Industrial
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Ross, J. O., Engineering Corp., New York, N. Y.

OVENS—Welding Rod Coating
Carl Mayer Corp., The, Cleveland, Ohio.
Industrial Oven Engr. Co., Cleveland, Ohio.
Morrison Engineering Corp., Cleveland, Ohio
Moslo Machinery Co., Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

PAINTS—Heat Resisting
American Chemical Paint Co., Ambler, Pa.

PAINTS—Marine
American Chemical Paint Co., Ambler, Pa.

PAINTS—Structural Steel
American Chemical Paint Co., Ambler, Pa.

PANS—Lead and Spelter
National Annealing Box Co., Washington, Penna.

PANS—Vulcanizing
Mossberg Pressed Steel Corp., Attleboro, Mass.

PAPER—Creped Wrapping
Crepe-Kraft Co., Newark, N. J.

PAPER—Insulating
Angier Sales Corp., Framingham, Mass.
Crepe-Kraft Co., Newark, N. J.

PAPER TESTERS—
Scott Testers, Inc., Providence, R. I.

PATENT ATTORNEYS—
Lancaster, Allwine and Rommel, Washington, D. C.

PICKLING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Parkin, Wm. M., Co., Pittsburgh, Pa.

PICKLING TANK LININGS—
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Sauereisen Cement Co., Pittsburgh, Pa.

PIPES & FITTINGS—Acid Resistant
Ceilcote, The, Co., Cleveland, Ohio
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.

PLASTIC TESTERS—
Scott Testers, Inc., Providence, R. I.

POTS—Lacquer
Industrial Oven Engr. Co., Cleveland, Ohio.

POTS—Lead Melting
National Annealing Box Co., Washington, Pa.
Robertson, John, Co., Brooklyn, N. Y.

POWDER—Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

PRESSES—Hydraulic and Mechanical
Robertson, John, Co., Brooklyn, N. Y.

WHERE TO BUY, Continued

Standard Machinery Co., Providence, R. I. (Mechanical Only)

PRESSES—Lead
Robertson, John, Co., Brooklyn, N. Y.

PRESSURE VESSELS—
National Annealing Box Co., Washington, Penna.

PULLERS—Wire
Scudder, E. J., Fdry. & Mach. Co., Trenton, N. J.
Sleeper & Hartley, Inc., Worcester, Mass.

PUMPS—Hydraulic
Robertson, John, Co., Brooklyn, N. Y.

REEL AND TENSION STAND—
Fidelity Machine Co., Philadelphia, Pa.
Industrial Oven Engr. Co., Cleveland, O.
Moslo Machinery Co., Cleveland, Ohio.
Sleeper & Hartley, Inc., Worcester, Mass.
Syncro Machine Co., Perth Amboy, N. J.

REEL CRUTCHES—
Watson Machine Co., Paterson, N. J.

REELS—Annealing and Stranding
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS AND SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Takeoff
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Traverse
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio.

REELS—Vulcanizing & Impregnating
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REELS—Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

REFRACTORIES—High Temperature
Norton Co., Worcester, Mass.

ROD BAKERS—
Carl-Mayer Corp., The, Cleveland, Ohio.
Ross, J. O., Engineering Corp., New York, N. Y.

RODS—Wire—Non-Ferrous
Aluminum Co of America, Pittsburgh 19, Pa.
Hudson Wire Co., Ossining, N. Y.
Platt Bros. & Co., The, Waterbury, Conn.

RODS—Wire—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A., Sons Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

ROLL STRAIGHTENERS—
Moslo Machinery Co., Cleveland, Ohio.

ROPE—Wire
Bethlehem Steel Co., Bethlehem, Pa.
Brewer Mfg. Co., Muncy, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

RUBBER AND RUBBER COMPRESSION TESTERS—
Scott Testers, Inc., Providence, R. I.

RUST PROOF COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.
Oakite Products, Inc., New York, N. Y.
Standard Industrial Compounds Co., Chicago, Ill.

RUST REMOVING COMPOUNDS—
American Chemical Paint Co., Ambler, Pa.
Apex Alkali Products Co., Philadelphia, Pa.

SATURATION SYSTEMS—
Industrial Oven Engr. Co., Cleveland, Ohio.

SHEARS—
O'Neil-Irwin Mfg. Co., Minneapolis, Minn.

SHEET—Steel
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.

SOAPS—Industrial and Wire Drawing
Apex Alkali Products Co., Philadelphia, Pa.
Bick, Hans C., Inc., Reading, Pa.
Magnus Chemical Co., Garwood, N. J.
Miller, R. H., Co., Inc., Homer, N. Y.
Potter, Neil C., Newark, N. J.
Standard Industrial Compounds Co., Chicago, Ill.

SOLVENT RESIN SYSTEMS—Experimental
Industrial Oven Engr. Co., Cleveland, Ohio.

SPOOLS—Annealing and Wire Drawing
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Shipping and Shop
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPOOLS—Steel
Apco Mossberg Co., Attleboro, Mass.
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.
Stevens Metal Products Co., Niles, Ohio.

SPRINGS—Steel
Wickwire Spencer Steel Co., New York, N. Y.

STAMPINGS—Steel
Hubbard Spool Co., Chicago, Ill.
Mossberg Pressed Steel Corp., Attleboro, Mass.

STRAND—Steel and Copper
Brewer Mfg. Co., Muncy, Pa.

STRIP—Brass and Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

STRIP—Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Roebling's, John A., Sons Co., Trenton, N. J.

STRIP METAL TESTERS—
Scott Testers, Inc., Providence, R. I.

SWIFTS—Take-off
Apco Mossberg Co., Attleboro, Mass.
Mossberg Pressed Steel Corp., Attleboro, Mass.

TANK LININGS—Brick
Ceilcote Co., The, Cleveland, Ohio.
Keagler Brick Co., Steubenville, Ohio.
Nukem Products Corp., Buffalo, N. Y.

TANKS—Pickling
Ceilcote Co., The, Cleveland, Ohio.
Haveg Corp., Newark, Del.
Heil Engineering Co., Cleveland, Ohio.
Nukem Products Corp., Buffalo, N. Y.
Sauereisen Cements Co., Pittsburgh, Pa.

TANKS—Steel
Mossberg Pressed Steel Corp., Attleboro, Mass.
National Annealing Box Co., Washington, Pa.

TENSILE TESTERS—
Scott Testers, Inc., Providence, R. I.

TESTING INSTRUMENTS—
Davis, R. L., Electric Co., Wallingford, Conn.
Scott Testers, Inc., Providence, R. I.

TOOLS—Wire Cutting
Porter, H. K., Inc., Everett, Mass.

TRAMRAIL SYSTEMS—
Cleveland Tramrail Div. of the Cleveland Crane & Engineering Co., Wickliffe, Ohio.

TRAVERSES—
Hubbard Spool Co., Chicago, Ill.
Stevens Metal Products Co., Niles, Ohio

TREADS—Safety
Norton Co., Worcester, Mass.

TRUCKS—
Morgan Construction Co., Worcester, Mass.
Vaughn Machinery Co., Cuyahoga Falls, O.

TUBE BENDERS AND FORMERS—
Ruesch, H. J., Machine Co., Newark, N. J.

TURKS HEADS—Friction and Power
Standard Machinery Co., Providence, R. I.

VALVES AND FITTINGS—Acid Resistant
Haveg Corp., Newark, Del.

VULCANIZERS—
Watson Machine Co., Paterson, N. J.

VULCANIZING PANS—
American Insulating Mach'y Co., Phila., Pa.
Mossberg Pressed Steel Corp., Attleboro, Mass.

WELDERS—Spot and Butt
Eisler Engineering Co., Newark 3, N. J.
Micro Products Co., Chicago, Ill.
Moslo Machinery Co., Cleveland, Ohio.

WIND-UP AND UNWIND SYSTEMS—Continuous
American Insulating Mach'y Co., Philadelphia, Pa.
Entwistle, James L., Co., Pawtucket, R. I.
Industrial Oven Engr. Co., Cleveland, Ohio.

WIRE—Aluminum
Aluminum Co of America, Pittsburgh 19, Pa.

WIRE—Cast
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Cold Heading
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Indiana.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Electric
Hudson Wire Co., Ossining, N. Y.

WIRE—Enameled for Coils
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Manufacturers
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE—Music
Spencer Wire Co., West Brookfield, Mass.

WIRE—Nickel Silver and Phosphor Bronze
Hudson Wire Co., Ossining, N. Y.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Non-Ferrous to Specification for Special Purposes
Hudson Wire Co., Ossining, N. Y.
North American Philips Corp., Dobbs Ferry, N. Y.
Winsted Div. of Hudson Wire Co., Winsted, Conn.

WIRE—Spring
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.

WIRE—Stainless Steel
Firth-Sterling Steel Co., McKeesport, Pa.
Spencer Wire Co., West Brookfield, Mass.

WIRE—Steel—Also Coppered Steel—Also Galvanized Steel
Bethlehem Steel Co., Bethlehem, Pa.
Continental Steel Corp., Kokomo, Ind.
Firth-Sterling Steel Co., McKeesport, Pa.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Keystone Steel & Wire Co., Peoria, Ill.
Roebling's, John A. Sons, Co., Trenton, N. J.
Spencer Wire Co., West Brookfield, Mass.
Wickwire Spencer Steel Co., New York, N. Y.
Youngstown Sheet & Tube Co., Youngstown, Ohio.

WIRE AND STRIP—Zinc
Platt Bros. & Co., The, Waterbury, Conn.

WIRE TESTERS—
Scott Testers, Inc., Providence, R. I.

WIRE, WEAVING—Non-Ferrous
Hudson Wire Co., Ossining, N. Y.

WRAPPING PAPER—Creped
Crepe-Kraft Co., Newark, N. J.

YARN TESTERS—
Scott Testers, Inc., Providence, R. I.

YARNS AND TAPES—
Dobeckmun Co., The, Cleveland, Ohio.

The WATSON MACHINE COMPANY

ESTABLISHED 1845

PATERSON, NEW JERSEY, U. S. A.

Wire & Wire Products

July, 1945

ELECTRICAL WIRE AND CABLE AND WIRE ROPE MACHINERY

CAGE TYPE High Speed CLOSING HEADS "HH"

PATENTS PENDING

EASE OF OPERATION and TORSIONAL RIGIDITY are the outstanding advantages of this Straight-Line Cage-type Heavy-duty Closer Design.

* * *

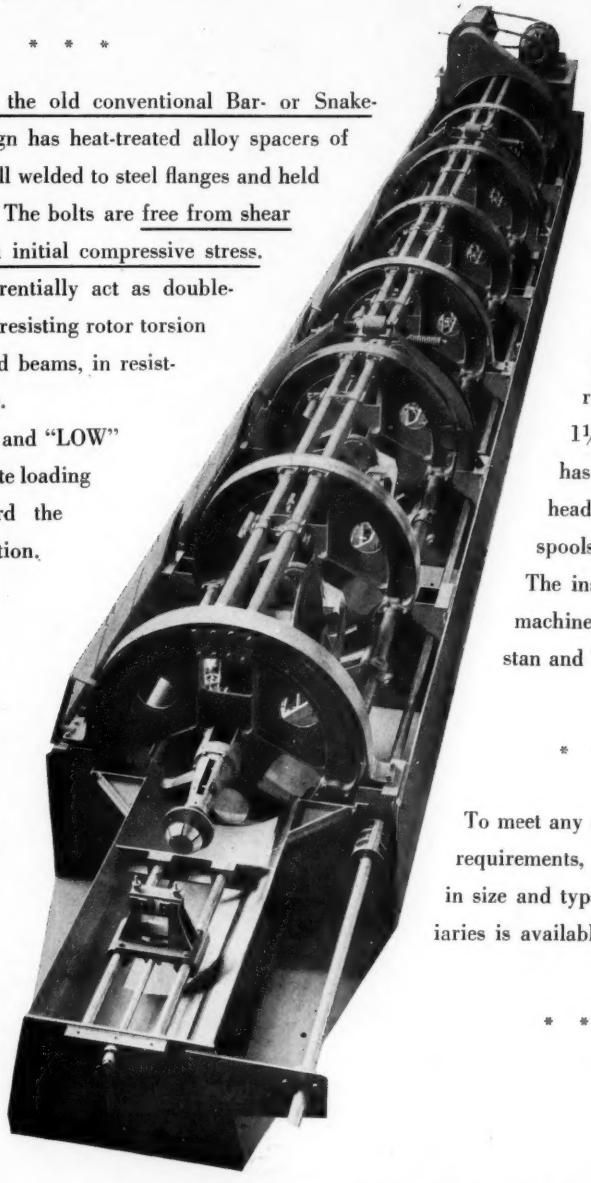
Not to be confused with the old conventional Bar- or Snake-Machines, our "HH" design has heat-treated alloy spacers of large diameter and thin wall welded to steel flanges and held by heat-treated thru-bolts. The bolts are free from shear and the spacers free from initial compressive stress. Three tube-pairs circumferentially act as double-ended canti-lever beams in resisting rotor torsion and radially as rigid-ended beams, in resisting centrifugal force effects.

The "OPEN" construction and "LOW" Lead angles greatly facilitate loading and threading, and afford the greatest visibility in operation.

"RIGID TANK FRAME" insures permanent alignment and provides for greatest accessibility to all adjustment and service points.

TWO-SPEED Drives, TUNGSTEN - CARBIDE Guides, all ANTI-FRICTION bearings, many refinements and attention to detail all combine to make this the best design offered to date.

* * *



* * *

The Head shown on this cut W-2477 P.2, is a 7-spool, 10-ton Wire Rope Closer for 40″ flange x 20″ traverse, 4,000-pound spools. The rope range is ½″ to 1½″. A 50 H.P. Motor has reserve power. The head alone (without spools) weighs 40 tons. The installed length of this machine complete with Capstan and Takeup is 90 feet.

* * *

To meet any conceivable customer requirements, a wide range (both in size and type) of patented auxiliaries is available.

* * *

The same "HH" Closer Design is also offered to suit 30″ and 24″ spools, these smaller machines being rated 5 and 3-ton units respectively.

* * *

Data Sheets on request.

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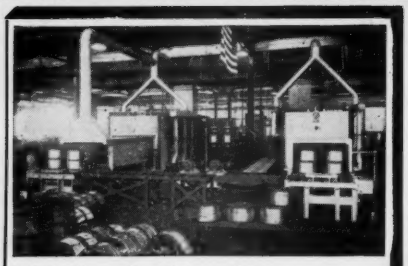


Bright Annealing Copper Wire on Large Reels and in Coils

The two EF combination gas-electric furnaces shown above bright anneal 5000 pounds of wire per hour — uniformy and continuously.

We specialize in building production furnaces.

THE ELECTRIC FURNACE CO.
SALEM, OHIO.
Oil, Gas and Electric — Kilns and Furnaces

Annealing High Carbon Wire and Rod - - Without Decarburization

We build electric and fuel fired furnaces for annealing, normalizing, scale-free hardening, heating for forging, copper brazing — in fact for every heating and heat-treating process.

Submit your furnace problems to EF engineers.

THE ELECTRIC FURNACE CO.
SALEM, OHIO.
Oil, Gas and Electric — Kilns and Furnaces

For Production Furnaces

For Handling Products in Any Shape or Size

FURNACES OIL, GAS or ELECTRIC

For Every Heating and Heat Treating Process

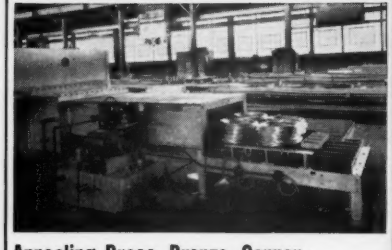
Aluminum Brazing
Annealing
Billet Heating
Bright Annealing
Bright Hardening
Copper Brazing
Controlled Atmosphere
Carburizing
Drawing
Enameling
Forging
Hardening
Malleablizing
Silver Soldering
Nitriding
Normalizing
Soaking Pits
Scale-Free Hardening
Quenching Machines
Ceramic Kilns, etc.
Process Heating

We Build the Furnace to Fit Your Job

THE ELECTRIC FURNACE CO.
SALEM, OHIO

Consult EF Engineers

No Job is Too Large or Too Unusual



Annealing Brass, Bronze, Copper and Nickel Silver Wire and Strip

Wire and strip in coils and wire on spools or reels is clean or bright annealed in EF furnaces similar to the above.

We build the furnace to fit the job—no job is too large or too unusual.

THE ELECTRIC FURNACE CO.
SALEM, OHIO.
Oil, Gas and Electric — Kilns and Furnaces

Bright Annealing Copper Wire on Small Spools and in Coils

This small EF special atmosphere pusher type furnace handles 800 pounds per hour. We can build them to handle any tonnage required.

Additional information sent on request.

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